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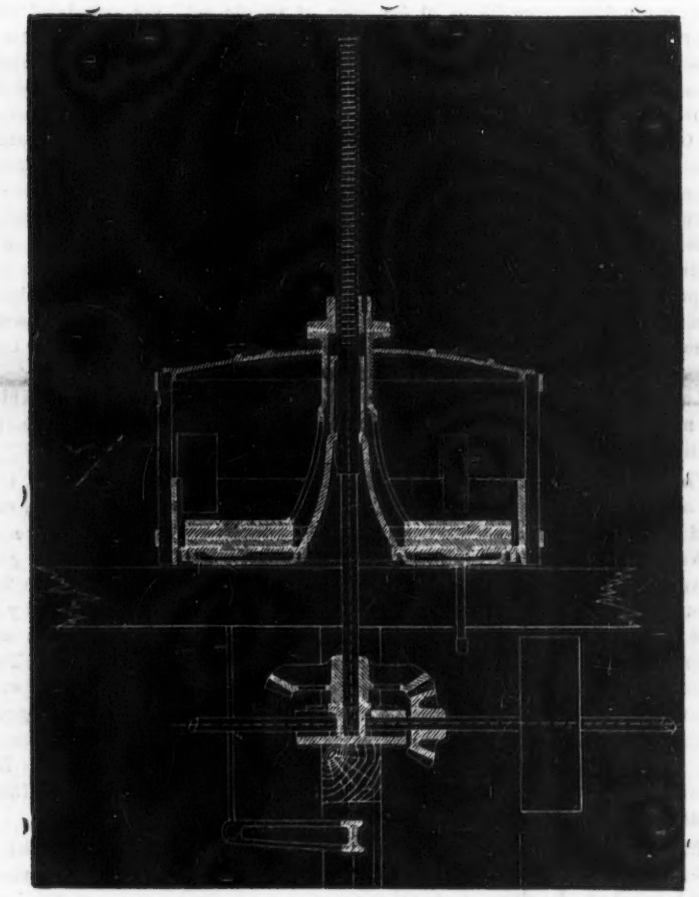
The Combination Pan.

In continuation of our series of American milling machinery, we print this week an illustration of the "Combination" pan. It is the Wheeler pan with the Patton footstep, the only thing of its own being a cast-iron ring set in the pan to protect the wooden sides. This ring can be replaced when worn. We have already illustrated the Wheeler (December 31) and the Patton pan, (January 14) and, therefore, need not repeat the descriptions we then gave. This machine is interesting as showing the growth of the American pan process by constant individual additions, followed by combinations which have resulted in the regularly working and efficient and handy pans found in so many mills.



THE WHEELER COMBINATION PAN.

The Iron Trade of Pittsburgh.

In 1870, in iron and steel alone, we had $26,692,686 invested as capital, and employed 15,541 hands. The increase in the number of rolling mills, furnaces, foundries, etc., is so rapid that the figures of one year furnish no data for the next. In 1863 we had 27 rolling mills, which had increased in 1871 to 43—an increase of 60 per cent. in eight years. During the same time the foundries and machine shops had increased from 45 to 75, or 68 per cent. Puddling furnaces increased from 262, in 1863, to 562 in 1871, or 115 per cent. The number of nail machines increased from 408 to 508, or 25 per cent. In 1863, 132,000 tons of metal were used by the mills, while in 1871 400,000 tons were consumed. The number of blast furnaces has largely increased, and the manufacture of pig iron here may be said to be in its infancy as yet. It required a long time to demonstrate that the ore could be carried to this city and smelted at a profit. Up to 1872 we had but five furnaces in blast, with the capacity of 1,000 tons per week. During the last year four new furnaces were erected, and are now in successful operation, turning out 1,700 tons of metal per week. These nine furnaces now produce annually about 150,000 tons. The total consumption of raw iron in this city, in 1872, was not less than 600,000 tons, so that we have had to draw from abroad 450,000 tons to supply the demands of the year. Several other furnaces are projected, and the time is not far distant, in the opinion of those experienced in the business, when all the raw iron consumed here will be the immediate product of our own furnaces. There is no reason why this should not be so. The total product of pig iron in the United States, for the year 1870, was 2,045,123 tons, so that Pittsburgh consumed over one-fourth of the whole production of the country.

The total receipts of pig ore and blooms, at Pittsburgh, were 496,648 tons, against 367,207 tons in 1871. The amount of Lake Superior ore received here in 1872 was 81,630 tons, against 48,080 tons in 1871. Of Iron Mountain ore we consumed in 1872, 67,630 tons, against 36,390 tons in 1871. There have also been used 20,580 tons of Lake Champlain ore (the first ever used here), and 4,010 tons of "native" ores.—*Pittsburgh Commercial.*

The American Institute of Mining Engineers.

BOSTON MEETING, FEBRUARY, 1873.

The Institute assembled in the hall of the Massachusetts Institute of Technology, on Tuesday evening, February 20, at 8 o'clock, when the following introductory address was delivered by Prof. T. STERRY HUNT, LL. D., F. R. S.

After some preliminary remarks, in which he welcomed the members of the Institute to Boston, and called their attention to the principal objects of interest in and about the city, Dr. HUNT proceeded to consider some points relating to

THE GEOGNOSTICAL HISTORY OF THE METALS.

The geognostical relations of the metals and their ores present many problems of great interest alike for the geologist, the chemist and the mining engineer. The association with certain rock formations of characteristic mineral species may help to guide the geologist in the identification of geological horizons, and throw light on the chemical activities which have been especially manifested in certain periods, while it is clear that such relations, if established, must be of great utility to the miner, and especially to the explorer of new regions. In inquiries of this kind, however, it is only by careful observations over wide areas, and by the collocation of a great number of facts, that anything like a safe basis for induction can be attained. The effects of hasty and imperfect generalizations in this field have already in many instances been felt to the prejudice of scientific progress. I come before you to-night, therefore, not to lay down any law or general principles, but to call your attention to certain facts, many of them doubtless known to you, which have forced themselves on my attention, with regard to the associations of various metallic ores and other useful minerals with different series of stratified rocks, and to ask you to aid the progress of this branch of geognostical inquiry. Your observations in the various regions to which you may be called by your professional duties will enable you to determine how far these associations are mere coincidences, and how far they are chemical and geological constants. The associations here to be noticed concern only those mineral species which occur either distributed through the strata in such a manner as to show that they are contemporaneous deposits, or occupy rifts or gash-veins in these strata, and may be supposed to have been filled from them. The question of the mineral contents of those great lodes which penetrate to unknown depths, and traverse successively rock-formations of different ages, is but indirectly related to our present inquiry.

I begin by the consideration of the crystalline stratified rocks of Eastern North America, which I believe to be entirely distinct from and anterior to the uncrystalline paleozoic strata, of which they have very generally been regarded as only altered portions.

Among these crystalline rocks we may, I think, distinguish at least four great types which are lithologically and at the same time geographically distinct. These four series are as follows:

I. The Laurentian, including the ancient gneissic series of the Laurentides, the Adirondacks, the Highlands of the Hudson, and the southern prolongation of the latter.

II. The Norian or Labradorian series (the upper Laurentian of LOGAN), dis-

tinguished by the predominance of norites or labradorite and hypersthene rocks, which are, however, associated with more or less of gneiss, limestone and quartzite, like those of the Laurentian. The rocks of this second series are extensively developed in Labrador, and occur, spreading over various areas, among the Laurentides, from thence to Lake Huron. They are well known in Essex County, New York, and have lately been recognized alike in the Black Hills in Wyoming, in the White Mountains in New Hampshire, and further eastward in New Brunswick. They are newer than the Laurentian series, upon which they rest uncomformably, but their age in relation to the two series about to be noticed is not so clear.

III. The Huronian series, which is lithologically distinguished by the predominance of dioritic, epidotic, doloritic, talcose and micaceous schists. This is widely spread along both the north and south shores of Lake Superior, along the north shore of Lake Huron, and constitutes the Green Mountain range of Eastern Canada and New England, stretching thence northeastward into Newfoundland, and southwestward along the Appalachians. Rocks apparently belonging to this series fringe portions of the eastern coast of New England, and are seen with a wider development in the coastal range of southern New Brunswick.

IV. The great gneiss and mica-schist series of the White Mountains, which may be traced northeastward across the State of Maine to the St. John River, and beyond, and southwestward to Manhattan Island, and thence along with the Huronian in its continuation in the Appalachians. Rocks apparently of this type are also found in proximity to the Huronian at various localities in the vicinity of Lake Superior; and the broad surface marked as Laurentian in the geological map of Canada contains, in various positions, as, for instance, between Lake Ontario and the Ottawa River, areas of rocks presenting the characters of the Green Mountain and of the White Mountain series. It is long since OWEN called attention to the close resemblance between the crystalline schists of Wisconsin and those of New England.* The distribution of the crystalline rocks of the Norian, Huronian, and White Mountain (or Montalban) series suggests the view that they are the remaining fragments of great formations once widely spread over an ancient floor of granitic gneiss; but that the four series mentioned include the whole of the crystalline stratified rocks of Eastern North America is by no means certain. How many more formations may have been laid down over this region and subsequently swept away, leaving only isolated fragments, we may never know; but it is probable that a careful study of the geology of New England and the adjacent British provinces may establish the existence of many more than the four series above enumerated. When it is considered that we find within the limits of Southern New Brunswick alone small areas of paleozoic sediments, which are shown by their organic remains to belong to no less than five periods, namely, Menevian, Lower Helderberg, Chemung, Lower Carboniferous, and Carboniferous, all perfectly well distinguished, and each reposing on the older crystalline rocks, we are prepared for a history not less varied and complete for the rocks belonging to Eozoic time.

But to return to the subject which we have proposed for consideration at this time, let us briefly notice some of the more prominent facts connected with the metalliferous deposits which appear to be proper to these several series of crystalline rocks. The Laurentian is remarkable, as is well known, for its great deposits of crystalline iron ore, in part specular, but chiefly magnetic, sometimes associated with iron pyrites and copper pyrites, and not unfrequently offering a considerable admixture of crystalline apatite, and more rarely of graphite. These iron ores appear, as a general rule, to be not far removed from the great formations of limestones and pyroxenic rocks which are intercalated, as subordinate parts, in this ancient gneissic series. The ores occur in the form of beds or interstratified masses, evidently of contemporaneous deposition, the layers of sedimentation being in some cases marked by the occurrence of a greater or less amount of disseminated apatite, orthoclase, pyroxene, quartz, or calcite. There are not, however, wanting examples of transverse veins in this series holding crystalline magnetite, in some cases in such quantity as to be available for exploitation. So far as my observation goes, the ores of this series, though frequently more or less titaniferous, are seldom, if ever, highly so, in which respect they offer a marked contrast to those of the series next to be described. A noticeable fact in the history of these Laurentian rocks is the occurrence in New Jersey of the red zinc ore, with its associated franklinite and zincic and manganesian silicates. These minerals seem, from the descriptions given, to belong to veins. We may recall the fact, in this connection, of the abundance of graphite and of apatite, not only in the iron ore beds, but in the limestones and pyroxenic rocks of the series, both in the beds and accumulated in veins, which seem, however, to be of limited extent, and probably rather gash-veins than true lodes. They are of great antiquity, as shown by the fact that they do not traverse the beds of the Potsdam sandstone, which rest upon their outcrops, and sometimes include fragments of these ancient veinstones. The other metals known in these ancient rocks are small amounts of copper pyrites, pyrrhotine, and iron pyrites, sometimes associated with nickel and cobalt.†

The Norian or labradorite and hypersthene rocks are noticeable chiefly for their titaniferous iron ores, which, so far as I have examined them, are either pure titanate of iron, menacannite, or at least contain so much titanium as to render them unfit for treatment by the ordinary methods in the blast furnace. While I am not as yet aware of a single deposit of pure magnetite in the Norian rocks, I can mention numerous examples of highly titaniferous ore occurring in them. Rawdon, near Montreal, and Chatean Richer, near Quebec, present areas of norites holding thin layers or small masses of pure menacannite; Bay St. Paul offers a third Norian area on the north side of the St. Lawrence, where huge beds of a titanate of iron, often mixed with rutile, are found. Farther down at the Bay of Seven Islands, and in the vicinity of Lake St. John, occur large deposits of more or less highly titanic ores, also in norites; and other less important examples might be mentioned in the same region. I may add that the titaniferous ores of Westport, in Essex County, New York, appear to belong to the norites of this region, and that those near St. John, New Brunswick, contain small masses of a similar ore, which I have also detected in the norites of the Isle of Skye, the original hypersthene rocks of MACCULLOCH; while to the westward, in the Black Hills of Wyoming, highly titaniferous granular ores are associated with a beautiful granitoid norite, of which I am indebted for specimens to Prof. R. W. RICHARDS. These titaniferous ores are not, so far as my observation goes, accompanied by apatite, and are comparatively free from phosphates in any form.

The Huronian rocks, and what I regard as their equivalents in the Green Mountains and elsewhere in North America, are a highly metalliferous series. To these belong the great deposits of hematite and magnetite of Lake Superior and similar, though less important, beds in the Green Mountains and their prolongation, which, though less extensive than those of the northwest, are sometimes very pure. Associated with them in the Appalachians are, however, beds of more or less titanic ore, and in parts of the province of Quebec great beds of rich ores, holding from 25 to 30 per cent. of titanic acid, are associated with chloritic schists, dolomites, and serpentines. The generally schistose structure of these ores, as well as of the hematites of this series, is a noticeable characteristic when contrasted with the uniform absence of such a structure in the ores of the Laurentian and Norian series. There are, however, not wanting examples in the Green Mountain range of granular ores which are magnetic and at the same time more or less titaniferous. These, at least in one example, are separable when crushed, into a non-magnetic, highly titanic portion and a pure magnetite. A similar result may be obtained with the granular titanic ores of the Norian series, when, as is often the case, these, instead of being non-magnetic ores, holding the maximum of from 45 to 50 per cent. of titanic acid, contain a less proportion of this element, and are found to be mechanical mixtures of highly titaniferous, non-magnetic grains, with a magnetic portion which, although sometimes retaining a little titanic acid, is at other times got nearly pure by a process of magnetic separation. The disintegration of ores of this kind appears to have given rise to the abundant iron sands of the lower St. Lawrence, which are mixtures of nearly pure magnetite with a highly titaniferous non-magnetic portion.

The chromic iron ores seem to be characteristic of this Huronian series, and the occasional presence of micas and various other silicates, bright green, colored by chromic oxyd, marks these rocks, in their distribution from Lake Superior to New Brunswick and Newfoundland, though this element is more rarely concentrated in the form of chromic iron ore. The chemical process which has given rise to the deposits of this ore is not yet understood; but it is worthy of note that while it is sometimes a compound of the oxyds of chrome, iron and magnesia, it includes in other varieties a large proportion of alumina. This presence of unsilicated alumina suggests a relation both with spinel and with corundum; and in this connection it should be noticed that the emery deposit of Chester, in Massachusetts, occurs associated with rocks apparently belonging to the present series, and with mineralogical associations which, as Dr. JACKSON has shown, resemble very closely those of the emery of Asia Minor, studied by Dr. J. LAWRENCE SMITH.

The presence of nickel with the serpentinic and other magnesian rocks of this Huronian series is almost as general as that of chrome, while both of these metals appear to be absent from the serpentines and similar rocks of the Laurentian series. It is worthy of notice in this connection that the olivine of some meteoric stones contains nickel, and the frequent presence both of nickel and chrome in these uranolites is curiously suggestive in relation to extra-terrestial geology. DAUBRÉE, by the fusion with reducing agents of serpentines containing nickel and iron oxyds, has, as is well known, obtained an alloy of iron and nickel together with the magnesian silicate chladnite or enstatite, an association common to meteoric masses.

It is scarcely necessary to call attention to the well-known fact that the Huronian rocks abound in copper, which generally occurs as a sulphuretted ore, and forms intercalated contemporaneous beds of cupriferous iron pyrites, or is disseminated in magnesian limestones, chloritic, talcose, or micaceous rocks, or finally fills fissures and veins which traverse the strata. It is associated with both gold and silver.

The White Mountain series in the Appalachians seems to be comparatively poor in mineral deposits, though to it belong the only traces of tin ore as yet known to us in Eastern North America. It is with the gneisses and mica-schists of this series that cassiterite has been found in Massachusetts, New Hampshire and Maine, in concretionary aggregates with tourmaline, beryl, micas, feldspars, fluor-spar, etc., recalling the associations of the tin ores of Europe. At Winslow, in Maine, the veins traverse a micaceous limestone, which, I conceive, be-

* See for a farther discussion of this subject the author's address before the American Association at Indianapolis in 1871.

† For a detailed notice of the mineralogy of these Laurentian rocks see the author's essay in the Report of the Geological Survey of Canada for 1863-66, reprinted in the Report of the Regent of the University of New York for 1869.

longs to this series. Bismuth and its ores are, moreover, met with in several localities in rocks of the White Mountain series, which in some localities are cut by well-defined lodes, carrying copper ores with molybdenite and pyrrhotine, which suggest analogies with those great lodes which, in Colorado, are so rich in gold and silver, and traverse gneissic and granitoid rocks of Eozoic age.

The gold of the Appalachians is certainly in part in rocks of the Huronian series, and occurs in veins with quartz, chalybite, copper-sulphids and specular iron in the talcose schists, and also in the true steatites of the series. The gold-bearing quartz veins of a still higher horizon in New Hampshire and Quebec have been referred by LOGAN to the upper or true Silurian period, but, I think, without good reason; since the containing argillites are not to be confounded with the Lower Helderberg limestones which sometimes rest upon them. I am disposed, in the present state of our knowledge, to look upon them as of the same age as the similar gold-bearing slates of Nova Scotia, which are considered by HARTT and MATTHEW to be not far from the age of the Menevian of New Brunswick, thus belonging near the base of the Cambrian, a horizon below anything represented in the New York paleozoic system. Mr. SELWYN has well compared these auriferous strata of Nova Scotia with the Lower and Middle Cambrian rocks of Wales, which are also gold-bearing; but there, as here, the gold is found alike in these paleozoic strata and in the underlying crystalline schists. The auriferous quartz of Quebec evidently fills fissures, and is of subsequent deposition, while that of Nova Scotia is often intercalated in such a manner that I have expressed the opinion that it belongs in part to contemporaneous beds, although Mr. SELWYN regards them as of subsequent origin. In face of the evidence urged in favor of his view, I am disposed to admit that some of the intercalated beds may be of subsequent introduction; but I still think that many of them, at least, are like those described by EMMONS, in North Carolina, contemporaneous beds of auriferous quartz.*

We are here led to mention the once famous theory of MURCHISON that the gold deposits of the world occur only in rocks of Lower and Middle Cambrian (or what he called Lower Silurian) age, a notion now well known to be untenable, even when coupled with his view that the introduction of the gold took place in the Tertiary period. The conglomerates at the base of the carboniferous in Nova Scotia are in some places a cemented auriferous gravel of the Paleozoic age, holding spangles of gold derived from the erosion of the still older Cambrian schists, which were, at that early time, already impregnated with the precious metal. It is well known, moreover, that the gold-bearing veins of Vörospatah in Transylvania intersect Eocene sandstones, while on our Western coast we have auriferous lodes of Jurassic age, and it even appears, from the observations of LAUR, that the silicious matters now deposited from the thermal waters of Nevada contain gold, and that the deposition of auriferous quartz which, in Nova Scotia, was anterior to the coal period, and probably belonged to the earliest Cambrian, is still going on.

This conclusion is the less surprising since SONSTADT has lately informed us that the sea water of the present day, in addition to the silver which it has long been known to contain, holds, dissolved, an appreciable quantity of gold, equal to a grain to a ton, and that in the iodine of the sea we have an agent capable of dissolving this metal, even at ordinary temperatures. The views maintained by LIEBER, GENTH, and SELWYN, of the solution and redisposition of gold in modern alluvial deposits seem to be well grounded, and we are led to the conclusion that the circulation of this metal in nature is as easily effected as that of iron. The transfer of certain other elements, such as titanium, chrome and tin, or, at least their accumulation in concentrated forms, appears, on the contrary, to require conditions which are no longer operative, at least at the surface of the earth. We have here a problem suggested which is of great interest, alike to the chemist and the geologist; but I reserve its consideration for another occasion.

The gold and silver which are met with in the Huronian rocks in the Appalachian region of Canada appear, like the associated copper ores, to be contemporaneous with the strata; and such, from the information received is, I am inclined to believe, the case with the rich deposits of these precious metals, accompanied with tellurium recently found in the Huronian of Lake Shebandowan, to the north of Lake Superior. A few words about the silver deposits of a more recent period in that vicinity, which have lately attracted so much attention, may not be out of place. We may here remark that the late researches of Messrs. BROOKS and PUMPELLY seem to establish that the great copper-bearing series of Keweenaw occupies a place between the Huronian schists, and the nearly horizontal red and white sandstone of the region, which is itself below the Trenton limestone. In all this they have confirmed the previous conclusions of HOUGHTON, WHITNEY, HALL and LOGAN. The silver deposits of Thunder Bay and its vicinity, including Silver Islet, are in veins, traversing a series of dark colored argillites and sandstones, which are as yet known only in this region, and are overlaid in slight discordance by red and white sandstones, apparently the same with those of the Keweenaw district and the St. Mary's River. This older series of Thunder Bay and its vicinity, which may be named the Animikie group, from the Indian name of the bay, is the lower division of the upper copper-bearing series of LOGAN.†

The great Keweenaw group, with its copper-bearing cupriferous amygdaloids is here absent, though met with a few miles to the eastward, and the almost horizontal dark-colored sediments of the Animikie group rest directly upon the edge of the crystalline Huronian schists, and are cut by great dykes of diorite. These in their turn are intersected by metalliferous lodes which traverse, without apparent change, both the stratified and the eruptive rocks, and carry silver in the one and the other. The great deposit of this metal in the vein on Silver Islet, is found between walls of diorite; but the same vein, in its prolongation, is barren alike in the sandstones of the Animikie group, and in a second diorite dyke, while at the same time other and similar veins in the region are rich in silver at points removed from diorite, leading us to suspect that there does not exist, as has been supposed, any connection between the eruptive rock and the presence of silver in the lodes. It is asserted, though I was not at the time of my late visit able to verify the fact by my own observation, that one of these lodes has been traced beyond the limits of the sandstones, and found to cut the underlying Huronian schists, still preserving its metalliferous character.

The consideration of these facts leads us to inquire into the grounds of the generally received notion that metallic deposits are often connected with plutonic action. Many facts are adduced in support of this view; and it may not be amiss to ask what is their real significance, and how far they justify the conclusion. In a great number of instances, as in the lead and zinc deposits of the Mississippi valley and of many other regions of uncrystalline rocks, it will be admitted that there is no apparent connection between the accumulation of these metallic ores and plutonic action, except so far as this may be implied by the probable intervention of thermal waters. The case is different when we come to regions of crystalline rocks, where, however, we find that the presence of masses whose plutonic character is more than doubtful, are adduced in support of the theory. So long as diorites like those so frequently interstratified in the Huronian series were regarded as rocks of igneous origin, so long as serpentine and even steatites, certain quartzites and crystalline limestones were supposed to be eruptive, nothing was more easy than to find in the vicinity of most deposits something which would do duty as an igneous rock and thus help to support the hypothesis. Yet those of us who learned geology twenty-five years ago are aware that such views of the nature of many crystalline rocks were then almost universal, and that they still hold a place in the systems of many of our eminent teachers. Even when the hydrous character of serpentine gave rise to doubts as to its plutonic origin, it was maintained in accordance with the views of a well known school, that this rock had probably resulted from a complete chemical transformation of eruptive granites, or related rocks, by a process of what was variously designated pseudomorphism or metamorphism. When, however, we recognize, as I think we inevitably must, the indigenous character of most of these magnesian silicated rocks, we shall find that by far the greater number of examples adduced in favor of the relation of plutonic rocks with metalliferous deposits will have disappeared. Many of those which still remain connected with the name of granite will, I believe share the same fate, when we carefully distinguish, as we must, between true eruptive granites on the one hand and the great masses of indigenous granitic gneiss which occur interstratified with crystalline schists, and have been so often confounded with exotic granites, or between these latter and the granitic veinstones, which are evidently of hydrothermal and concretionary origin, and abound in the ancient crystalline strata, and even in the eruptive granites themselves.

That the metallic impregnations of more recent depositions are, in many cases, connected with the proximity of older crystalline rocks, whether eruptive or indigenous, is, however, undoubted. Thus the deposits of copper ore in the newer strata, which, in the province of Quebec, lie along the northwest base of the Green Mountains, are not improbably due to the results of oxydation of the cupriferous beds which abound in the crystalline schists of these mountains, from which the dissolved metal accumulated in basins at their foot, by a process similar to that suggested by MURCHISON with regard to the cupriferous Permian strata at the base of the similar crystalline rocks of the Ural Mountains. To a like process we may perhaps ascribe the rich deposits of native copper in the Keweenaw amygdaloids and conglomerates, which rest upon the ancient Huronian schists. That the same metalliferous character which belongs to the stratified indigenous diorites of the latter is also to be found in certain eruptive diorites is not to be questioned; and these, like stratified rocks, may not only furnish metallic ores to fissures traversing them, but by the results of their partial decay or by the oxydation of the metallic ores which they may contain, give rise to metallic solutions, which, like those from the crystalline schists, may impregnate adjacent and more recent sediments. If the view which I hold, in common with many other geologists, that most, if not all, of our known eruptive rocks are but displaced and altered sediments, be true, then it may be fairly affirmed, not that eruptive rocks are the agents which impregnate sedimentary deposits with metals, but, on the contrary, that in such deposits is to be sought the origin o metalliferous eruptive rocks, and that all our metallic ores are to be traced to aqueous solutions. The appearance of thermal waters charged with metallic matters may, perhaps, in some cases, be connected with the extravasation of plutonic rocks, thus affording a certain justification of the notion of a relation between the latter and ore deposits. [See a lecture by the author on "The Origin of Metalliferous Deposits" in this Journal for June 18 and June 25, 1872.]

I have thus, in the spirit of an inquirer, brought before you many questions which demand for their discussion far more time than we can command this evening. I have not sought to generalize with regard to the distribution of metals in our crystalline rocks, but rather to invite your attention to some of the

* See my Report on the Gold Region of Nova Scotia. Geographical Survey of Canada. 1868.

† I am indebted for important observations on the geology of this region to Mr. PETER MCKELLAR, of Fort William, Lake Superior, and shall soon publish them in connection with my own.

facts which have come under my notice. Your wider observation may serve to confirm or perhaps to modify the conclusions to which they now seem to point. To you, therefore, I trust to continue the inquiries here suggested, feeling sure that it is only by bringing together facts in their natural relations that we may hope to extend the bounds of geognostical science, and arrive at wider and more philosophical views of the origin and the distribution of metalliferous deposits.

THE PRESIDENT'S REPLY.

Mr. RAYMOND spoke as follows:

It is my pleasant duty to reply once more, as I have done on so many occasions already, to the cordial greetings extended to this Institute. And this duty is the more agreeable, since the welcome we have received comes from the lips of one who is not only a citizen of Boston, but also an honored colleague of ourselves. Self-gratulations are always sincere, and the flattering introductory remarks of our distinguished fellow-member have the pleasing character of a satisfactory soliloquy. What must be the double glory of those fortunate gentlemen of our Local Committee, who are entitled to dividends of the praise deserved by Boston, and likewise of the praise bestowed upon the Institute of Mining Engineers! I must be permitted, in all seriousness and sincerity, to congratulate Boston, as well as the Institute, on the acquisition of our distinguished colleague, Dr. HUNT. Canada had him too long; he belonged to us; we are right glad we have got him once more in his native land, and we shall not willingly let him go again.

A friend recently inquired of me what special appropriateness there is in the selection of Boston as a place for our meeting—what connection there is between Boston and the objects of our Society? I might reply, that we do not depend upon local conditions for those social and professional elements which we carry with us, wherever we go. *Ubi Cæsar, ibi patria;* where the Institute meets, there are mines and furnaces. The subterranean echoes reverberate in our words; the glow of forge-fires is reflected in our earnest zeal; steam-hammers pulse through our debates; "wet" processes are illustrated in our social gatherings; perfect fusion, without confusion, and such slight explosions only as indicate that our materials are not altogether dry, or that our waste gases sometimes strike back in the flues—these things are sufficient to create for us a suitable professional atmosphere, without the aid of catacombs beneath our feet, or molten treasures before our eyes.

But we do not need to fall back in such self-sufficient wise upon our own resources. The attractions of Boston are great enough and appropriate enough to justify us in a special desire to gather here. I do not mean to be so heartless as to adduce the disastrous conflagration of three months ago, as merely a curious metallurgical operation on an unusual scale, though that it was—a huge assay, which has demonstrated the fineness and the indestructibility, not indeed of Boston buildings, but of Boston courage, patience and unconquerable enterprise. The waste of property by the millions is not altogether a waste, if, when the cinder is skimmed away, it leaves a regulus of fire-proof manhood, refined but not diminished in the trial.

We come to Boston, however, not to study her smoking ruins, nor to admire her heroic temper. We recognize in her a center of that power which it is our object to apply to the improvement of the professions and industries we represent—the power of knowledge and thought—the power of science. The ancient and still vigorous society in whose hall we meet, and the energetic and successful institution near by, as well as the stately University which casts its shadow of old and new learning over Boston, are proofs of the vitality of science here. Nor are these the only proofs. If you would know the whole intellectual force of Boston, you must go beyond Harvard, and even (forgive the sacrilegious thought) outside the *Atlantic Monthly*. You must see how almost every line of investigation in science, if pursued back to its sources, bisects somewhere a Bostonian; how the books in special branches of study, for which you ransack in vain the collections of other cities, are found on the shelves of the Boston public library, free for the use of every citizen; how Boston enterprise and capital have penetrated to the remotest corners of the land. Nor is this city unconnected with noteworthy achievements in mining and metallurgy. Not to speak of her great home establishments, and of those which in neighboring cities practically belong here, I need only call to mind her investments in the iron and copper mines of Lake Superior, and in the gold and silver mines of the West.

If you penetrate into the mountains of Colorado, you will find the largest and most successful metallurgical establishment of the West, the works of the Boston and Colorado Company, shipping annually nearly a million of dollars in concentrated copper matte; and still further, among the snowy peaks that look down upon the Middle Park, the well-planned silver mines and works of another Boston company, under the charge of Col. CANDLER, a Boston man.

Perhaps it is as well, on the present occasion, not to allude to the hand which Boston may have had in the Union Pacific Railroad or the Credit Mobilier. Those enterprises seem to have been so multifariously supported that it is very difficult to say who did not have a hand in them!

I suppose we shall be told that mining and metallurgy are not sciences, but arts; and that we who pursue them occupy a place a grade below that of the disciples of scientific research, the seekers after truth as truth, for its own sake. Gentlemen, I would do no injustice to any form of science, physical, mental, or moral. But it should be borne in mind that the absolute truth is what we never can attain; our utmost investigations give us only the truth as it is related to man. And it is truth for man's sake that we seek.

It was my good fortune to be present, a fortnight ago to-night, at the farewell banquet given to Professor TYNDALL by the scientific and literary men of New York, and attended also by a host of guests comprising an unequalled array of the scientific and literary men of the United States. Aside from the relations between religion and science, which received perhaps an undue share of attention from the orators of the evening, the principal stress was laid on the great value of scientific research, as distinguished from mere invention or applications of natural laws to useful ends. It is announced that Professor TYNDALL has generously devoted to the encouragement of the former the entire profits of his American lectures. Far be it from me to detract one iota from the praise which is due to the earnest, honest, and disinterested inquirers who have made the secrets of nature available for the use of man. But when so much emphasis is laid upon that kind of physical investigations, which promises no immediate benefit, as if it were a higher kind; as if truth lost something of its dignity when conjoined with utility; as if it were aristocratic to deal with abstractions, like atoms and ether, but vulgar to find out things that it happens to be worth money to know; then I feel justified in vindicating the dignity of the craft of those who work for money and for man.

For what is the significance of the statement that a discovery is "worth money?" Merely this, that it lessens human toil, refines or enlarges the product of toil, transfers toil from the ruder muscular sphere to the sphere of mind, which is the sphere of machinery. A machine, a mechanical or a metallurgical process, is the incarnation of the spiritual power, the symbol of man's control over nature, and every new one lifts us higher in the scale of potency, making the race more and more dominant over its circumstances. The money that a discovery is worth constitutes the general estimate of the good it will do. This estimate may be erroneous, the world may be short-sighted in the measurement, but the element of utility is not therefore an unworthy one. "Not as the servant of Mammon," says Professor TYNDALL, "but as the supporter and enlightener of the mind of man, would I have you take science to your bosoms." Very good; but minds supported and enlightened in that way will certainly make money; that is, they will save labor, or do more work with the same labor. The fact is, that it is impossible to prevent science from being useful to mankind, unless it be locked up in the bosom of the student. This would be strictly seeking truth *as* truth, seeking merely for the sake of knowing; but our great philosophers would scorn such selfish isolation. To know truth that we may tell it, apply it, make it fruitful, is the key-note of science; and the truth about ores and minerals, fire-clay, fluxes and blasting-powders, is as worthy of knowledge as the atmosphere of a fixed star.

Sir HUMPHREY DAVY did not scorn, amid his brilliant discoveries of the alkaline metals and his researches into every department of chemistry, to invent the safety-lamp, which is not diminished in scientific value because it has saved thousands of human lives and exorcised the most terrible demon of the subterranean deep. FARADAY was not ashamed to make his investigation in magnetism and electricity useful to the arts, or, pausing in his high career, to invent a way of removing the noxious gases from burning lamps. And TYNDALL, while he may reflect with justifiable pride upon his study of the invisible spectrum of heat, or his masterly analysis of the azure of the sky, need not blush to have devised a respirator, which protects the wearer against malaria, poison, dust and smoke, and which is "worth money."

Realizing, then, the dignity of that kind of science of which we are disciples, without assailing the dignity of any other kind (if other kind there be, which I greatly doubt), we gather in Boston, to renew our social intercourse and interchange of thought. If I may judge from the letters I have received from many members prevented from being present to-night, the hearts of our absent brethren are with us. It is yet too soon to boast of what our young society has achieved; but this we can safely set down as accomplished—that we have personally found pleasure and profit in the meetings of the Institute. No power can obliterate that record. History may write an epitaph of failure on our corporate tomb in days to come, though I trust she will not; but in the worst conceivable case, her inscription must be qulified with words of praise. If she shall begin by saying "This body of men accomplished far less than they talked about accomplishing: in two years their Committee on Coal made but one preliminary report; and their Committee on Iron, none at all"—and more words of like awful censure—she must at least conclude by saying, "But they *did* have good times!"

In spite of the high-toned sentiments in which I have been indulging (and which will look well, I hope, when printed in the Journal of our Proceedings), I will fully confess to your private ears, that while the object of the Institute of Mining Engineers is to benefit mankind, the object of *the meetings* of the Institute (you perceive the subtle distinction) is "to have a good time." This frank statement of our motive and plan will of itself explain why we came to this city. The friend who inquired what was the connection between the place and our objects was simply ignorant of the said objects!

And so, gentlemen, with cordial good fellowship in our own bosoms, and a ready recognition of it in the genius of the place, we welcome ourselves to Boston.

THE COAL TRADE.

NEW YORK, February 27, 1873.

Business has improved and there is a considerable call for coal. At the auction sale 90,000 tons of Scranton coal was sold at a slight advance. The prices obtained, with the averages as made up by Mr. JOHN MOORE, 64 Trinity Building, were:

	Tons.	Highest.	Lowest.	Average.
Lump	5000	3.92[3]	3.85	3.87
Steamer	10,000	4.20	4.02[2]	4.10
Broken	20,600	4.25	4.15	4 19
Egg	15,000	4.45	4 45	4.45
Stove	25,000	5.27[3]	5.20	5.24
Chestnut	15,000	4.00	3.95	3 96

The Reading Company has made the following prices at Port Richmond, for March.

	Lump.	Steam.	Broken.	Egg.	Stove.	Che'nut.
Hard white ash	$4	$4	$4.00	$4.15	$4.30	$3.50
Free burning white ash	4	4	4.00	4.15	4.30	3.50
Schuylkill red ash	..	..	4.25	4.40	4.60	3.75
Alaska red ash	..	..	4 00	4.15	4.30	3.50
Shamokin white ash	..	..	4.55	4.70	4.70	4.00
Shamokin red ash	..	..	4.55	4.70	4.70	4.00
North Franklin	..	..	4.60	4.75	4.85	3.75
Lorberry	..	..	4.75	4.75	4.75	4.00
Lyken's Valley	..	..	5.50	5.50	5.50	4.25

The Reading Railroad has raised its tolls about 35 cents a ton. Shipments from Port Richmond will begin after March 3, the road reconstructed at that place being finished. On and after March 3d, 1873, and until further notice, a drawback of forty cents per ton will be paid on all Anthracite coal shipped from Port Richmond.

The average price of coal in the Schuylkill region, was $2.63 38-100, thus making wages for February four per cent. advance upon the basis.

The *Miners' Journal* says that trade is beginning to increase, and as soon as the harbors are open there will be a brisk business, as the stocks are light and the market will be pretty well cleaned out by that time. Activity is, however, chiefly confined to the line and Philadelphia trade.

The Lehigh Coal Exchange has published the following prices for March, at Elizabethport, Port Johnston, and Hoboken.

Lump	$5 00
Broken	5 20
Egg	5 20
Stove	5 50
Chestnut	4 60

Bituminous coal has again become a commodity, the receipts at Amboy having at length begun. The Consolidation Company reports price at Georgetown and Alexandria $4.60, and at Baltimore $5.00

Anthracite Coal Trade.

Week ending February 15, 1873, compared with week ending February 17, 1872.

COMPANIES.	1872. WEEK.	1872. YEAR.	1873. WEEK.	1873. YEAR.
Phila. & Reading R. R.	70,170	529,895	53,863	624,964
Schuylkill Canal	....	13,356	....	6,594
Lehigh Valley R. R.	45,281	560,265	40 850	526.34a
Lehigh & Susq. R. R.	15,087	148,401	45,544	241,655
Lehigh Canal	....	....	....	....
Scranton North	12,080	85,978	12,395	81,771
" South	33,542	258,691	36,401	224,009
Penn. Coal Co. R. R.	17,633	116,312	15,474	92,110
" " " Canal	..	....	....	....
Del. & Hud. C. Co. Canal	..	....	....	....
" " " East	7,728	70,31	5,773	38,341
" " " West	8,7-5	50,134	11,449	52,321
" " " South	6,597	47,827	6,451	41,602
Shamokin	8,751	39,5-7	8,717	58,986
Trevorton	....	....	....	....
Lykens Valley	....	....	....	....
Wyoming North	....	....	....	....
" South	....	....	....	....
P. & N. Y. C. & R. Co.	....	....	12,319	109,918
Williamstown Col'y	....	....	....	....
Big Lick Col'y	....	....	....	....
	225,614	1,918,723	272.636	2,098,486
			225,614	1,9 8,723
ncrease			46,022	179,763

Bituminous Coal Trade.

Week ending February 15, 1873, compared with week ending February 17, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	....	....	....	....
B. & O. R. R.	19,434	122,598	22,325	12,823
Penn. South. Line	....	...	1 531	10 936
H. & B. T. R. R.	9,484	36,548	16,137	56,834
Harrisburg & D.	5,640	89,268	5 299	53,049
L. V. R. R.	....	....	666	4 968
P. & N. Y. R. R.	5,131	58,517	....	40,384
Cumberl'd Branch Canal	....	....	....	....
" " R. R.	....	....	2,877	12,696
	38,689	306,931	48,835	309,080
			39.689	306,931
Increase			9,146	2,149

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Feb. 22, 1873, compared with the week ending Feb. 24, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
*Phila & Reading R. R†	72,760	601,645	45,983	670,847
*Schuylkill Canal	....	13,356	....	6,594
*Lehigh Valley R. R.	54,586	614,121	48,702	575,017
Lehigh & Sus. R. R.	18,209	176,611	33,505	275,160
Lehigh Canal	....	....	....	....
Scranton North	12,626	98,404	11,561	93,332
" South	36,140	294,835	39,376	263,385
Penn. Coal Co., rail	16,957	133,269	13,362	105,463
" " " canal	....	....	....	....
Del. & Hud. Canal Co.	....	....	....	....
" " East	10,017	80,434	6,012	44,353
" " West	8,752	58,857	10,515	62,857
" " South	7,835	54,589	5,183	46,755
Shamokin	8,977	48,534	10,041	69,027
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. Co.	....	....	13,136	123,054
Williamstown Col'y	....	....	....	....
Big Lick Col.	....	....	....	....
Total	256,859	2,174,965	237,336	2,335,824
1870	237,346			2,174,965
Increase				160,859
Decrease	19,523			

These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1872 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 22, 1873, compared with week ending Feb. 24, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	..	....	....	....
B. & O. R. R.	19,886	142,484	24,307	152,519
Penn. S. Line	....	.....	1,781	12,717
H. & B. T. R. R.	....	36,584	....	56,834
*Harrisburg & D.	4,964	94,232	4,608	59,652
*L. V. R. R.	....	....	594	5,562
P. & N.Y.C. & R. Co.	5,735	64,252	5,681	46,065
Cumberl'd Branch Canal	....	....	....	....
" Railroad	....	....	2,597	15,293
Total	30,585	337,552	39,563	348,642
			30,585	337,552
Decrease			8,978	11,090
Increase				

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Feb. 22, 1873, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	14,603 02	145,123 06
" Hazleton	28,559 11	341,516 04
" Upper Lehigh	66 07	921 01
" Beaver Meadow	10,461 09	131,206 05
" Mahanoy	5,324 00	68,390 04
" Mauch Chunk	170 04	786 18
Total	59,184 14	688,043 16
Same time last year	65,515 05	703,753 18
Increase		
Decrease	6,330 11	15,710 02
Forwarded East from Mauch Chunk by rail	48,701 15	575,917 00
Same time last year	54,856 03	614,121 08
Increase		
Decrease	6,154 08	39,104 08

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	47,297 08	562,443 03
do East for use L. V. R. R.	1,404 07	12,573 17
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,283 00	15,645 00
To P. & N. Y. R. R.	8,028 12	76,218 18
To N. C. R. R., at Mount Carmel		1,788 19
To D. H. & W. R. R.	382 07	9,000 02
To L. & S. R. R. at Packerton for rail	211 03	3,361 07
Delivered at M'h Chunk	44 12	1,058 16
Delivered on line of road above Mauch Chunk	533 06	4,377 04
To L. S. & R. R., at Penn Hav., for railroad		1,511 10
Do. for canal		
To Lehigh Canal Mauch Chunk		
To Catawissa Railroad		35 00
To'al	59,184 14	689,043 16

Report of Coal Transported over Central R. R. of N. J. (Lehigh and Susq. Div.)

Week ending February 22—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1873., tons ct.	WEEK 1872. tons ct.	YEAR 1873 tons cwt.	YEAR 1872. tons cwt.
Wyoming Region	22066 16	19920 19	225367 04	149564 05
Upper Lehigh Region	4070 10	3950 16	29217 06	2 183 09
Beaver Meadow Region	4571 00		27816 04	5309 03
Hazleton Region	328 17	310 09	2436 06	2262 05
Mauch Chunk Region	9767 06	10756 08	54130 10	35729 05
Treskow Region				
Mahanoy Region				
Totals	40824 09	34936 04	338967 10	219048 10
Increase	5886 01		119919 00	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	33505 05	2:209 09	.7319 08	176619 13
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	598 06	1065 16	13767 08	8775 17
L. V. R. R at Packer'n	774 10	488 02	7241 01	2294 19
Delivered to L. & B. R. R. at Plymouth Bridge	1069 03		5894 0	
	4477 05	5185 01	29904 03	3134 7 05
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co.	13447 13	10756 04	96841 09	40048 02
W.-B. O. & I. Co.	1016 18	13 35 03	120755 14	1.5077 04
Totals	23464 11	24591 07	217597 03	145125 06
Increase			72471 17	
Decrease	1126 16			

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Feb. 22, 1872.

BY RAILROAD.—ANTHRACITE.

	Tons.	Cwt.
PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.		
From St. Clair	7,631	04
" Port Carbon	1,668	14
" Pottsville	905	12
" Schuylkill Haven	16,192	11
" Pine Grove	858	00
" Tamaqua	2,876	05
" Harrisburg	180	02
" Dauphin		
Total	29,643	08
FOR SHIPMENT BY CANAL.		
Passing Frackville Scales		
" Mill Creek "		
" Schuylkill Valley Scales		
" Mt. Carbon "		
" Cressona "		
" Pine Grove "		
" Tamaqua "		
Total		
SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.		
Via Catawissa & Williamsport Br.	420	16
" N. C. R. R. passing Locust Gap	1,215	10
" " " Shamokin	5,114	08
" " " Herndon		
Total	6,750	14
SHIPPED WEST OR SOUTH FROM PINE GROVE.		
Via Schuylkill & Susquehanna R. R.	654	16
" Lebanon & Pine Grove Branch	265	06
Total	920	02
CONSUMED ON LATERALS.		
From Frackville Scales	484	16
" Mill Creek "	148	04
" Schuylkill Valley Scales	606	09
" Mt. Carbon "	357	15
" Cressona "	411	16
" Pine Grove "	8	04
" Tamaqua "	384	19
Total	2,372	02
LEHIGH AND WYOMING COAL.		
Received via Silverbrook Junction, Sent East Cat. & Wpt. Br. Sent West	4,461	08
" " Rupert, Cat. & Wpt. Br.	70	08
" " Allentown, E. Penn'a Br.	122	07
" " Alburtis, "	49	15
" " Oreland, G. & N. Br.	993	00
" " Connecting R. R.		
" " Willow Street R. R.	600	08
Total	6,297	04
BITUMINOUS.		
From Harrisburg	4,592	18
" Connecting R. R., G. & N. Br.	10	00
" Junction R. R.		
Total	4,602	18
COAL FOR COMPANY'S USE.		
Anthracite	3,923	13
Bituminous	164	08
Total	4,088	01

RECAPITULATION.

	Total for Week.	Corres-p'g week last year.	Increase and Decrease.
Passing over Main Line and Leb. Val. Branch	29,643 08	60,266 12	d 30,623 04
For Shipment by Canal			
Shipped Westward via Northern Central R. R.	6,750 14	5,844 15	905 19
Shipped West or South from Pine Grove	920 02	1,443 03	d 523 01
Consumed on Laterals	2,372 02	3,820 00	d 1,447 18
Lehigh and Wyoming Coal	6,297 04	1,385 11	i 4,911 13
Total Anthracite paying freig't	45,983 10	72,760 01	d 26,776 11
Bituminous	4,602 18	4,963 17	d 360 19
Total of all kinds paying freig't	50,586 08	77,723 18	d 27,157 10
Coal for Company's use	4,088 01	3,196 14	i 893 07
Total Tonnage for Week	54,674 09	80,919 12	d 26,245 03
Previously this year	774,264 12	738,056 01	i 36,208 11
Total to date	828,937 01	818,975 13	i 9,961 08
SHIPPED BY CANAL.			
From Schuylkill Haven			
" Port Clinton			
Total Tonnage per Week			
Previously this year			
Total to date	6.594 00	13,355 18	d 6,761 18

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, February 22, 1873.

	WEEK.	SEASON
North	50,920 11	333,018 11
South	6 153 04	46,755 07
Total 1873	56,073 15	379,773 18
Corresponding time in 1872:		
North	46,777 07	366,654 08
South	7,834 13	51,988 12
Total	54,612 00	418,642 15
Increase North		
Decrease No th		
Increase south		
Decrease South		
Increase	1,461 15	
Decrease		38,768 17

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending February 21, 1873.

	Tons.	Cwt.
East	321 18	
West	9,718 16	
		10,040 14
Same time last year		8,976 18
Increase		1,063 18
Decrease		
Total amount shipped to date		69,726 11
Same time last year		48,533 16
Increase		20,492 15
Decrease		

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending February 22, 1872.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	8,028	12	76,218	18
" Lack. & B. R. R.	696	10	5,944	01
" Pleasant Valley R. R.	3,586	13	32,479	17
" Sul. & Erie R. R.	824	04	8,410	16
Total	13,135	19	123,053	12
Same time last year	12,048	15	109,808	19
Increase	1,087	04	13,244	13
Decrease				
Distributed:				
To Lehigh Valley R. R.	560	18	9,279	13
To Lack. & B. R. R.	....		236	09
To S. Central R. R.	3,083	13	26,616	01
To Ithaca & A. R. R.	2,321	08	16,345	15
To Erie R. W. Pockets for shipm't.	3,888	09	36,458	17
To individuals on line of road	1,060	03	11,585	13
To points at & above Coxton for use of Co.	413	05	5,992	11
To points between Waverley and Elmira	1,818	03	16,568	13
Total	13,135	19	123,053	12
Bituminous received from BARCLAY R. R.				
Shipped north from Towanda	5,642	05	45,798	02
Shipped south from Towanda	38	16	267	03
Northern Central R. R.	....			
Total	5,681	01	46,065	05
Same time last year	5,734	11	64,251	14
Increase				
Decrease	53	10	18,186	09
Distributed:				
To Erie Railway	5,347	11	37,709	14
To So. Central R. R.	294	14	7,994	03
To Ithaca Valley R. R.	....		71	03
Lehigh Valley, R. R.	25	13	168	06
To individuals on line of Railroad.	13	03	80	02
To points on line of road for use of Company			41	12
Total	5,681	01	46,065	05
Grand totals transported				
Anthracite	13,135	19	123,053	12
Bituminous	5,681	01	46,065	05
Total	18,817	00	169,118	17
Same time last year	17,783	06	174,060	13
Increase	1,033	14	4,941	16
Decrease				

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Feb. 22, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l Tons.	Cwt.	B. & O. R. R. Tons.	Cwt.	Pa. S. Line Tons.	Cwt.	Total. Tons.	Cwt.
1873	—		24,306	12	1,781	10	26,088	02
1872	—		19,886	03	....		19,886	03
Increase	....		4,420	09	1,781	10	6,201	19
Decrease	—		.....		....			

YEAR.

1874	—		152,519	08	12,717	07	165,236	15
1872	—		142,483	19	....		142,483	19
Increase	....		10,035	09	12,717	07	22,752	16
Decrease	—		....		....		....	

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons.	Cwt.	To B. & O. R. R. Co. Tons.	Cwt.	Total. Tons.	Cwt.
1873	—		2,597	00	2,597	00
1872	—					
Increase	—		2,597	00	2,597	00
Decrease	.....		.....		.....	

YEAR.

1873			15,293	01	15,293	01
1872						
Increase			15,293	01	15,293	01
Decrease						

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending February 22, 1872.

	1873. WEEK.	YEAR.	1872. WEEK.	YEAR.
By Railway	13,352 08	105,463 03	16,957 02	133,269 12
" Canal	....		.....	
Total				
Decrease 1873	27,806 09			

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, February 22, 1872.

	WEEK.	SEASON.
By Delaware and Hudson Canal	....	....
By Railroad, East	6,012	44,353
" West	10,516	62,837
" South	5,153	46,755
Total 1872	21,680	153,945
Corresponding time in 1871:		
By Delaware and Hudson Canal	....	....
By Railroad, East	10,017	80,434
" West	8,752	58,867
" South	7,835	51,889
Total	26,604	191,190
Decrease	37,245	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Feb. 22, 1873.

	WEEK. Tons.	Cw	YEAR. Tons.	Cwt.
Shipped North	11,540	15	93,331	14
Shipped South	39,376	06	263,385	07
Total	50,937	01	356,717	01
For the Corresponding time last Year:				
Shipped North	12,625	14	98,408	19
Shipped South	36,139	12	294,835	04
Total	48,765	06	393,234	03
Increase	2,171	15		
Decrease	.....		36,517	02

Prices of Coal by the Cargo.

(CORRECTED WEEKLY.)

	AT NEW YORK. February 28. R. A.	W. A.	AT PHILADELPHIA. February 28. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	
Pea	— —	— —	— —	— —
LEHIGH.				
Freight to New York 50 cents.				
Lump, (on board)	— —	5 00	— —	— —
Broken	— —	4 75	— —	— —
Egg	— —	4 75	— —	— —
Stove	— —	5 10	— —	— —
Chestnut	— —	4 15	— —	—
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Honey Brook, Le'h	W.A. 4 15@5 10		— —	— —
Spring Mountain	" " — —@— —		— —	— —
Sugar Creek	" " — —@— —		— —	— —
Sugar Loaf	" " — —@— —		— —	— —
Old Comp'y's	" " 4 15@5 10		— —	— —
Room Run	" " 4 15@5 00		— —	— —
McNeal	" " — —		— —	— —
Girardville	" " — —		3 10@4 00	— —
Hill & Harris	" " — —		— —	— —
Shamokin	" " — —		— —	— —
Lykens Valley	" " — —		— —	— —
Broad Top	" " — —		3 25@4 25	— —
McMichael	" " — —		— —	— —
Henry Clay	" " — —		— —	— —

Company Coals.

March, 1873.

	L.	Str.	Gra.	Egg.	Sto.	Chest
*Scranton at E. Port	4 00	3 95	4 10	4 40	5 00	3 90
Pittston at Weehawken	4 40	4 40	4 40	4 40	4 80	4 40
*Lackawana at Weehawken	4 20	4 30	4 40	4 65	5 10	4 30
Wilk'b're at Hoboken	4 25	4 35	4 45	4 70	5 15	4 35
Old Co. Lehigh at Pt. John'n	5 25	—	4 85	4 90	5 15	4 15
Lehigh at Eliz. Port	5 00	—	4 75	4 75	5 10	4 15

For freights to different points see "Freights."
*To contractors only.

Prices at Baltimore—March, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 75@6 00
Pittston and Plymouth, do	5 75@....
Shamokin Red or White Ash, do	6 00@6 25
Lykens Valley Red Ash, do	....@6 50
By retail, all kinds per ton of 2,240 lbs	7 50@8 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
Kanawha Cannel, coarse	@12 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	....
Consolidation Coal Co.'s on board at Baltimore	....
Maryland Coal Co. "	....

Prices at Georgetown, D.C., and Alexandria, Va.

March, 1873.

George's Creek and Cumberland f. o. b. for shipping $....@.... [nominally.

No coal before spring.

Prices at Havre de Grace, Md.

March, 1873.

Wilkesbarre and other White Ash for Cargoes	$ @4 75
Lykens Valley	@5 75
Shamokin Red or White Ash	5 00

Bituminous Coals (Cumberland).

Georgetown, F. o. b.	$
Baltimore	
New York	

Prices of Foreign Coals.

March, 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	Nominal.
" " Cannel	15 00@16 50
" House "	22 00@23 00
" Orrel	17 00@18 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	23 00@25 00
Per ton 2,000 lbs. delivered.	

Prices of Gas Coals.

March, 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N.Y.

	Coarse.	Slack.
Block House	$2 00	$1 00
Gowrie	1 75	— 80

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou nett	$2 25	1 25
Sydney	2 25	— 80
Lingan	1 75	— 80
Caledonia	1 75	— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo. Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co.	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
Redbank Cannel, Penn	— — @— —
AT PHILADELPHIA.	
Westmoreland	7 00 @— —

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75	
Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.	
MAUCH CHUNK TO ELIZABETHPORT.	
L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	1 06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23
MAUCH CHUNK TO PORT JOHNSTON.	
L. V. R. R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23
TO HOBOKEN	
L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23
TO SOUTH AMBOY.	
L. V. R. R.	72
B. & D. R. R. / Cam. & Am. R. R.	1 06
Shipping Expenses	25
Total	$2 23
PENN HAVEN TO ELIZABETHPORT.	
L. V. R. R. Penn Haven to Phillipsburgh	0 84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

Foreign and Provincial Freight

March, 1873.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-2 tons	
Liverpool, 5 per cent primage	
TO NEW YORK.	
Provincial.	
Sydney	$3 00
Lingan	3 50
Cow Bay	3 75
Port Caledonia	3 10
Little Glace Bay	3 00
TO BOSTON.	
Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

Freights.—March, 1873.

TO EASTERN PORTS.	Cumberland. From Georgetown.	From Baltimore	Anthracite. From Philadelphia.	From Elizabethport, Port Johnston, and Hoboken.	From Weehawken.	From Rondout.
Amesbury						
Bangor		4 75				
Bath						
Boston	3 10	4 25		3 00		
Bridgeport	2 75	3 50		1 00		
Bristol				2 00		
Cohasset Nar'ows	2 25					
Derby						
Dighton	2 85					
East Cambridge				3 00		
Fall River	2 75	3 60		2 00		
Hackensack						
Hartford						
Hoboken	2 10					
Jersey City	2 10			50		
Lynn				50		
Middletown						
Mystic						
New Bedford	3 00			2 00		
Newburyport	3 10	4 75		3 20		
New Haven	2 75	3 50		1 00		
New London	2 75	3 50		1 40		
Newport	2 30			2 00		
New York	2 25	3 00		50		
Norwalk	2 50			1 00		
Norwich		3 60		1 60		
Pawtucket				ice		
Portland	3 25	4 25		2 00		
Portsmouth, N.H		4 25		3 10		
Providence	2 75	3 60		2 00		
Rockport						
Saco						
Sag Harbor				1 40		
Salem	2 70	4 50		3 00		
Stamford				1 00		
Stonington				1 40		
Taunton				ice		
Warren				2 00		
TO RIVER PORTS						
Albany						
Catskill						
Cocksackie						
Coeyman's						
Cold Spring	2 30					
Fishkill						
Haverstraw						
Hudson	3 25					
New York						
Nyack	2 25					
Poughkeepsie	2 50					
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy	3 00					
West Point						
Yonkers						

St. Thomas	$5 00	Gold.
Martinique	5 00	
Demerara	6 00	
New Orleans	6 00	
Mobile	6 00	

MARKET REVIEW.

NEW YORK, Feb. 27, 1873.

IRON—The arrivals of several hundred tons on a very dull market has caused a slightly easier feeling in Scotch Pig, and some parcels have been taken at a shade under previous quotations. Business on the part of importers is confined principally to small parcels for consumers, for which full prices are asked; we quote Eglinton $54a $55, Glengarnock $56, Gartsherrie 460, and Coltness $62 50; we understand that $59 was offered for a lot of Gartsherrie but refused; sales about 225 tons Glengarnock, ex ship, at $56; and 76 do. Eglinton, $54, both time. For American Pig there is a fair inquiry for No. 1 and No. 2 X, and some sales are reported at $50 for the former and $48 for the latter. New English Rails are very quiet—also American—and quotations are somewhat nominal; old English are generally held at $57 for T, and $60 for D. H., small lots only being obtainable, the bulk of the stock being held for higher figures; 100 tons D. H. sold on private terms. Scrap is in some inquiry, but the extreme difficulty of moving goods either on land or water interferes with business; we quote the market steady at $57 50a $60 per ton, without sales. Refined Bar continues steady at our quotations, with fair deliveries, considering the state of the streets. We note sales of 3000 bdls. American common Sheet, May and June delivery, on private terms.

AMERICAN PIG IRON.— From the annual report of the American Pig Iron Manufacturers' Association, held in this City last week, we condense the following: The production of Pig Iron in the United States in 1872 was about 2,388,250 tons, an increase of 25 per cent, over the production of 1871. The reports are not all in, but the aggregate will not vary much from that above given. The amount is divided as follows: Anthracite Iron 1,197,250 tons, Raw Bituminous Coal and Coke Iron 712,500, and Charcoal Iron 478,500. The total production of the State of Missouri for 1872 was 126,713 tons, or an increase of about 50 per cent. There is a large increase in the production in Georgia, Alabama and Tennessee, in which States a number of new furnaces are being built. The increase in the number of blast furnaces for 1872 far surpasses that of any previous year, the number built or begun being 109. The number actually determined upon for 1873 is 89. At a moderate estimate, this increased capacity would add 327,000 tons to the product of last year, and fears have been expressed that the market may be overstocked. To quiet apprehension as to a surplus production, the fact is cited that no less than 50 new rolling-mills have been built or begun, and that fully 30 per cent. has been added to the former puddling capacity of existing mills. The statistics of consumption show that the Pig Metal supply is yet far behind the demand. In the increase in productive capacity Pensylvania leads all other States, showing 48 new furnaces built and 11 projected, and 15 rolling-mills built and 5 projected during the year, making a total of 79 new works. Ohio ranks next in this respect, 13 furnaces having been built and 6 projected, and 7 rolling-mills built and 4 projected, making 30 in all. The total of new furnaces built was 109, projected 39; new mills 38, projected 11—total 191. The statistics laid before the Association are full of encouragement for the future, showing that the entire Iron industry is healthy and vigorous.

COPPER.—New Sheathing is steady at 43c. and Bolts and Braziers 45; Bronze and Yellow Metal Sheathing 27, and Y. M. Bolts 32, net cash. The market for ingot is nearly at a stand; the causes before noticed repress all speculative feeling, and manufacturers hold off altogether or buy only from hand to mouth. As a rule there is no pressure to sell, however, and previous prices are demanded, say 34¼a35c. cash, for Lake, and 30a30¼, 30 days, for best selected English; 50,000 lbs, Lake and 25 tons English sold on private terms.

LEAD.—Pig is quiet, but stocks are held firm at 6¾a6¾c. gold for ordinary foreign. Bar 9¼ c., Sheet and Pipe 10½, and 1in-lined Pipe 16½, usual discount to the trade.

SPELTER.—Silesian is quiet, but firm at 6¼a6¾c., for considerable parcels gold; domestic 16c. currency.

STEEL.—The market is steady and firm at old figures, with still a scanty supply of English.

TIN.—The market for Pig is dull and very irregular, and in some instances, rather lower prices have been accepted—at the same time we cannot quote a general decline; sales have been made of 500 slabs Straits at 31⅞a32⅛ c.; and 300 do., 31¼, gold. Banca and English are nominal. Prices of Plates keep up in England, but the response here is feeble; indeed, if anything, values are not as strong as they have been, the severe money pressure exerting an unfavorable influence. Sales have been made of 1500 bxs. Charcoal Tin at $11 50a11 75 for I. C. as to brand; 550 do. I. C. Coke, $10 37½; 3000 do. Charcoal Terne, $10 50a10 62½, and $9 75 for low grades; and 500 do. B. C. Coke Terne, $8 75. all gold.

ZINC.—Mosselmann Sheet continues firm at previous figures. Manganese black oxide, 3½c; do. peroxide, 5½ c.

We take the following circular of Messrs. BERGER, SPENCE & Co., dated Manchester, Feb. 11, 1873, from a recent number of the *Colliery Guardian*:

MINERALS—Notwithstanding all the overtures made for a solution of the labor difficulties in South Wales, there yet remains the sad fact that the strike still continues. The colliers, by their seeming determination not to forego any part of their programme of resistance, are incurring a blameworthy responsibility, which is condemned alike by the misery and destitution of their families and the increasing censure of public opinion. A reduction in the rate of wages does not now necessarily mean smaller weekly earnings, for, by a little more labor, they could easily maintain, if not exceed, their late earnings. And, besides, the country requires of them an increase in the production of coal, so as to allow of our manufacturing interests being maintained against the competition of rival nations, and this can only be secured by a liberal distribution of our natural advantages. The exports last month were 43,000 tons less than during January, 1872. Iron ore continues in good demand, but there is still a a difficulty in securing full supplies. Prices are again advancing, and for native hematite, of good quality, it is difficult to place contracts, except at extreme rates. The supply of lead ore is still inadequate to the demand, and prices consequently are very high. Good qualities of manganese difficult to procure. Calamine is also scarce, and increasing in value. At Redruth, on the 6th inst., 2,316 tons copper ore realized £12,679. Average produce, 7½; average standard, £112 9s. 2,000 tons ore and regulus sold at 17s. 9d. and 17s. 10½. Phosphate of lime of high percentage is still wanted for early delivery.

METALS.—The operations in this market continue on an extended scale, and prices rule high for all descriptions, with the single exception of copper. Some large exchanges have been made in Scotch pig iron warrants, and quotations are almost without change. The keen demand for Middlesborough pig iron has resulted in a further advance in prices by those smelters and merchants who are fortunate enough to have any available for delivery. There has been a decrease in the make of this iron for the month of January, as compared with December, of 1,036 tons, and an increase in the foreign shipments of 7,029 tons over the corresponding month in 1872; these combined have during the month caused a decrease in makers' stocks of 6,287 tons, and there now remains only 35,341 tons (or not quite one weeks production) in makers' hands and warrant stores that would be available for any sudden emergency. There is not quite so much inquiry for bar iron, but the demand for sheets is excessive. Copper is again retrograding, and prices considerably under list have been submitted to by holders of second-hand parcels of English make to induce sales. Chili bars also are easier. There is not much doing in tin, and rates for straits are slightly reduced. Lead is very firm, and but few smelters are in a position to sell either for present or forward delivery; a further advance is probable. A good business is going on in spelter, and values are again improved.

MANGANESE.—Ores, 140s. to 145s. for 70 per cent.

IRON ORE.—Hematite, 30s. to 35s. Oolitic, 7s. 3d. to 8s. 3d.

IRON.—"Ayresome" Yorkshire pig iron, nominal, No. 1, 122s. 6d.; No. 2, 117s. 6d.; No. 3, 115s.; No. 4 (foundry), 114s.; No. 4 (forge), 114s. net cash, or 2s. extra for four months' bill. Scotch pig, warrants, 134s. to 135s. Staffordshire bars, £13 to £13 10s. Hoop iron, £13 10s. to £14. Gas tubes, 30 per cent. off new list. Boiler tubes, 5 per cent. premium.

COPPER.—Nominal, English tough ingot, £93 to £94. Chili bars, £86 to £87.

TIN.—English ingot, £147 to £148. Straits, £143 to £144. Tin plates, best coke, I.C., 36s. to 38s.; charcoal, I.C., 40s to 44s. per box.

LEAD.—Best English soft pig, £22 10s. to £23. Refined red lead, £25 to £27.

ANTIMONY.—French star, £62 to £64. Spelter, Silesian, special brands, £25 to £25 10s.; English, best brands, £25 10.

LONDON, Feb. 8th, 1873.

The iron trade for the past week has been very good. A large demand, and prices still going up, as much as £12 10s having been obtained for rails. Indeed, it may be said that so far as prices are concerned the iron trade never was in a better position. The export trade, especially in rails and general machinery, being unusually brisk. The impetus lately given to the development of railway traffic in India, China, and Japan has already a decided effect in stiffening the price of steel rails, and we may confidently look forward to a steadily-increasing demand for some considerable time. The most startling occurrence of the week has been the sudden rise of 8s. a ton in the price of coals on Monday—best coals in London being now 48s. per ton—twelve months ago the same quality of coals were selling at 28s The sudden and severe change in the weather, and the heavy fall of snow has, no doubt, had something to do with the rise; but the simple fact is that so long as the strike in Wales continues and the output of coal is so very much less than the quantity required, the colliery owners are masters of the situation, and can ask any price they like. An immense amount of distress must result from the cold and the almost prohibitive price of coal to the poor. The effect on trade has been to send up the price of iron and of all articles of manufacture requiring heat for their production. Many of the London coal merchants, so far from benefiting by the rise, have lost—one or two firms rather heavily. There was a large demand for coal just before the notice of the rise came from the coal-owners, and as very few of the London coal-merchants have a large stock now on hand, they were obliged to buy at the increased price, and so lose on every ton for which they had taken an order before noon on Monday. The effect on the Share Market has been a general fall in railways, although this, perhaps, is partly owing to the large speculative sales caused by the recent advances.

The state of affairs at Merthyr remains the same, without apparently any disposition on the part of the men to accept any compromise. Mr. Brogden's proposition having been finally rejected, an important meeting of gentlemen who are interested in the manufacture of peat fuel in Ireland has been held at the Dublin Chamber of Commerce, for the purpose of investigating the various methods of preparing improved fuel, in order to ascertain which is the best and most economical mode. It is also proposed to make patent fuel on the Duke of Sutherland's estate, by the admixture of mineral oil, coal dust, or slack and dried peat, the three materials being found close together. It would indeed appear strange if, with this vast increase in the price of coal, modern enterprise and modern science should be found unable profitably to utilise the great tracts of bog-land to be found in Ireland and Scotland, and many parts of England and Wales.

IRON.—The situation is very much the same as it was a week ago, with an increased tendency to stiffer prices, especially in rails, for which there has been a great demand for export. Bars have reached from £12 to £13 12s 6d. Sheets £17 to £18, and hoops £14 10s.

COPPER.—The copper market has been rather quiet, with some fluctuations in prices caused by the operations of speculators; on the whole, there has been a decline in price. Lots quoted at £86. Wallaroo £91 for cash.

TIN continues very firm; great demand for Straits, of which the stock is small. The advance in the price of Straits during the month of January was equal to £8 a ton. The tone of the market was no doubt affected by the reports concerning Banca, the production of which has been estimated as only 38,000 piculs in 1872, as against 67,000 in 1871, and 75,000 in 1870. The company has a large stock on hand, and the spring sale may be expected to be very brisk.

Spelter is firmer, Silesian selling on the spot for £25 to £25 5s. There has been a strong demand for tin plates, with an advance on the previous weeks' prices.

Lead steady, and not much business done, with no advance in price.

IRON.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, FEB. 27, 1873.

The following report from the San Francisco stock Board is dated Feb. 25, excepting a slight decline in Cholar and Imperial, the list is decidedly firmer.

	Feb. 25.	
Savage	— 82	—
Crown Point	— 106	—
Yellow Jacket	— 82	—
Kentuck, "New Issue"	— 11	—
Cholar Potosi	— 49	—
Gould & Curry "New Issue"	— 15¼	—
Belcher "New Issue"	— 88	—
Imperial	— 8¾	—
Raymond & Ely	— 82	—
Meadow Valley	— 15¾	—

"ENGINEERING."

"The leading Engineering Journal of the world," indispensable to every Civil, Mining, or Mechanical Engineer, can now be obtained post-paid at $9 50 currency, by remitting Post Office order to NEW YORK OFFICE "ENGINEERING," 82 Broadway.

Accidents in the Coal Mines.

The *Scranton Republican* gives some statistics relating to the Eastern District of Luzerne County. This district comprises all the mines north of Wilkesbarre and east of the Susquehanna river, being ninety-five in all. The total production of coal in the district was 6,560,450 tons, or very nearly one-third of the entire anthracite production for the year 1872. The *Republican* says:

We do not propose to discuss the production of this magnificent coal field, but to refer to the annual death-roll that is before us. We have now the complete statistics of casualties in the mines during the past year, in Schuylkill, Northumberland, Dauphin, Columbia, and the Eastern District of Luzerne Counties. The only district from which we have no report is that comprising the lower part of Luzerne and the whole of Carbon Counties. There is some satisfaction in the fact that the lists of the dead and injured, and the widows and orphans, are not so large as they have been in former years, but they are nevertheless very great. We append the list for the anthracite regions, with the exceptions above noted:

	Killed.	Injured.	Widows.	Orphans.
Schuylkill	71	226	41	139
Eastern District Luzerne	67	187	38	119
Northumberland	8	26	3	14
Columbia	0	10	0	0
Dauphin	7	13	2	11
Total	153	462	84	283

The proportion of dead and injured, according to the amount of coal produced, is greatest in Schuylkill County. The proportion is as follows: In Schuylkill County there was one person killed for every 74,000 tons of coal mined; in the Eastern District of Luzerne, one for every 97,917 tons; in Northumberland, one for every 200,000 tons; and in Dauphin, one for every 76,000 tons. The seven or eight mines in Columbia County seem to be worked with extraordinary care, for no one working in or about them has been killed during the past two years, and only ten injured. The report of casualties published elsewhere seems to indicate that the mine ventilation law has been bearing good fruits during the year. Only three men lost their lives by explosions of fire-damp in the ninety-five mines in the district. This is a great improvement on the sad records of casualties of former years. The falling of coal and rock is the cause of a great proportion of the deaths and maiming in the mines. Of the 153 killed, as above enumerated, not less than 70 were crushed beneath falling coal and rock, and 140 of the injured received their injuries from the same cause. From the lists of the casualties in the mines in Schuylkill it would seem that the mines are either more dangerous on account of fire-damp than those in this district, or else the ventilation is not so good there as here. In the mining of 5,000,000 tons of coal mined in Schuylkill County 17 men were killed and 91 injured by the explosion of gas; in the Eastern District of Luzerne over 6,500,000 tons were mined and only three men killed and only twenty-three injured by gas explosions. This fact speaks well for the operators, and especially for the Mine Inspector of this district, Mr. PATRICK BLEWITT. It is evident that more care is being manifested than formerly, to enforce the provisions of the mine ventilation law.

Report on Peat.

In the beginning of the excitement consequent upon the rapid advance in coal prices in England, a commission was appointed to report upon the manufacture of peat on the continent, with a view of ascertaining whether some practical means could not be found to bring the immense bogs of Ireland into use as a substitute for coal. The Commission reported, what had already been well established, that the method of condensing raw peat by grinding was superior to the method by pressure. The machine which has given the best results both in Germany and Belgium "consists of a cast iron vertical mill about six feet high and three feet in diameter. In this vessel an iron shaft revolves, fitted with a series of blades, or arms, and for these, as well in respect to their form as to their arrangement on the shaft, the advantage is claimed that by a single operation the raw peat is not only sufficiently macerated but is also forcibly squeezed through the mouthpiece near the bottom of the machine. In this mouthpiece there are generally three apertures of about 3½ inches square, through which the peat issues, and as it does so it is cut by hand into lengths of about 10 inches. It is then laid on the drying ground, and when dry is reduced in bulk to from 6 to 7 inches long by 2 inches square. A small machine of this kind is capable of turning out 10,000 pieces in twelve hours, equal to about 4½ tons, employing a four horse-power engine and seven persons; a larger size was capable of producing about 35,000 pieces in the same time, or about 15 tons, making use of an eight horse-power engine and twenty-two persons. The cost of production may be estimated at two shillings per 1,000 pieces, exclusive of the wages of the engineman and the working expenses of the engine, which in all cases was fed by peat fuel, and the selling price of the manufactured peat was about 10s. 6d. at the works."

From these data, any one desirous of beginning the peat manufacture in this country can make a fair estimate of the cost. Peat made in the small machine, with seven persons, would cost for labor alone, with wages at $1 a day, about $1 55 per ton, and with wages at $1 50 per day, the cost would be $2 33 per ton. It is to be remembered that these estimates leave out entirely the cost of transporting the manufactured peat, an item that must compare very unfavorably, for equal distances, with coal, on account of the greater bulk of peat, ton for ton. As in all other questions, the problem of the economical substitution of peat for coal is in no wise a general one. It depends upon the special conditions of each case in regard to first cost and transportation.

While we are upon this subject, we will say that the experiment at Ishpeming continues with unabated vigor. The peat is now placed in a boiler and steamed, but whether the steam is used at a temperature capable of charring the peat we are not informed. There is good reason, in the condition of the Lake Superior region, for wishing to obtain some substitute for wood, which is dear, and were the trial at Ishpeming in the hands of men who understood the subject, and wasted no money in going over experiments which have already been made numbers of times and repeatedly with quite uniform results, there would be a prospect that iron would be made with peat. We can hardly hope to see 30-ton peat furnaces in operation, but with calm judgment and the guidance of previous experience, it might be possible to establish 5 and 10 ton peat furnaces which should produce a good foundry pig.

Buried Frogs.

The usual frog has this time appeared in a mine on the Pacific coast, and under such favorable circumstances that the San Francisco Academy of Sciences has been able to nip him in the bud, as Sir BOYLE ROACH would say. He reentered this life in a vertical shaft at the Black Diamond Coal Company's mine in Mount Diablo recently, and at the depth of 172 feet. This new birth of course made considerable noise in the neighborhood, and the president of the mining company visited the mine two days after, and tried to procure the pieces from which it was taken, but did not succeed. The rock is a soft sand rock. The man who found the frog says it was in a solid place that he struck his pick in, when out struggled the frog, and, after a moment, moved about in a lively manner. The Academy of Sciences thought it a good time to settle this frog-business once for all.

Professor DAVIDSON said there were no cases where the matrix had been found. A gentleman had told him, however, that once in Pennsylvania he had seen a in-a-rock frog taken out and had also seen the matrix.

Mr. DALL called to mind, from the proceedings of a scientific association, some experiments where an English gentleman had tried how long a toad could live in this manner. A slab of stone was taken and a number of holes cut in it, and in each was placed a toad, previously carefully washed and weighed to ascertain the exact weight. Then a glass was put over each hole and fastened on with Portland cement. The slab was buried in a garden and not taken up for some time. On being examined it was found that where the cement was perfect the toads were dead. Those in the holes where the cement had cracked were still alive. The slab was buried again and not taken up for three years. At the end of that time three were found to be alive. The holes were examined and it turned out that the cement had cracked in each instance undoubtedly, and perhaps had let in some small insects, for one toad weighed more than when he was put in.

The discussion was interesting; but we fear it left the frog question about where it was before.

The Iron Industry in Great Britain.

THE difficulties under which British ironmasters labor, are stated in a few words by *Ryland's Circular*, which says:

"With coal at the present high price, ironmasters are beginning to be in doubt as to the amount of their profits, even when £12 or £13 are demanded for merchant bars. It is not only the price of coal, but the deficient supply which troubles the ironmasters. We have been told by more than one extensive maker that it is with difficulty the works can be kept open four days in the week, in consequence of the short supply of fuel. The colliers seem to be possessed with the fearful notion that the more coal they bring to the surface the less money they will earn. The coal-owners, of course, are participating in the present unheard-of prosperity of the trade, but what with the men on the one hand and the masters on the other, the great outside public have to pay the piper. Of course, the iron trade is more closely connected with the coal trade than any other; but all manufacturing interests are now so seriously affected by the high rates now ruling in every district, that before long we shall be feeling the bad effects of what may be called a coal panic. In consequence of the 'coal difficulty,' prices for iron are every day increasing. Staffordshire bars are quoted at £13 to £14; common bars can be had for £12.

Sulphur in Laboratory Gas.

Mr. RILEY, the well-known chemist of the Dowlais Works, found, after many years' work upon iron analyses, that his determinations of sulphur had all been vitiated by the use of gas as a source of heat. The iron oxide exposed in the crucible, during ignitions, or the mixture of alkalis and ore during fusion, absorbed sulphur from the flame. Similar facts have been noted by other observers. In 1864, Dr. DAVID PRICE called attention to the fact that a not inconsiderable amount of sulphur is found in a simple fusion of alkalies in a crucible over a gas-flame; this, however, was only the case when the mixture crept over the sides of the crucible. In his experiments, three-quarters of an hour's heating was sufficient to give an appreciable amount of sulphur. These discoveries indicate that for the nice work of iron and ore analysis some other means of heating than gas must be used.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
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Editors.

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We find, in the London *Mining World*, a report of a meeting of the Richmond Consolidated Company, the mines of which are at Eureka, Nevada. According to this report, the Chairman said in the course of his address:

"Since I last had the pleasure of meeting you I have heard more of Mr. CLARENCE KING. He is a man of the highest character, of the greatest experience and scientific attainments, all of which gives us reason to believe that in him we have got about the very best man in the States it was possible to secure as our future manager."

This intimation of an engagement is news to so many of Mr. KING's friends, at least in this part of the country, that we are inclined to believe it an error, even though a Chairman announced it to a meeting of stockholders. Chairmen are not infallible in their statements or predictions; and this one, we surmise, has confounded Mr. KING's recent employment by the Richmond as an expert witness with his engagement as manager. So far as the operation of smelting works is concerned, we are not aware that CLARENCE KING has any special experience; we should put much faith in his general intelligence, scientific ability, integrity and administrative capacity; but we can scarcely believe that he would be easily tempted from the profession in which his laurels have been won.

The Boston Meeting.

WE commence this week our report of the proceedings of the Boston meeting of the American Institute of Mining Engineers, giving first the learned and acute address with which Dr. T. STERRY HUNT signalized the opening session. The papers and discussions of this meeting will be found, we think, not inferior in interest or value to those presented on former occasions. The history of the meeting is briefly as follows: Tuesday evening, Wednesday morning and afternoon and Thursday morning, sessions were held for the reading of papers and debate thereon. Wednesday evening, the Institute attended upon invitation the meeting of the Boston Society of Natural History, and enjoyed at a later hour the elegant hospitality of Mr. BOUVÉ, the President of the Society. Thursday morning, after adjournment, the Institute inspected with much interest the well-appointed lecture-rooms and laboratories, and particularly the novel mining and metallurgical laboratories, of the Massachusetts Institute of Technology. The nature and object of these are clearly set forth in a paper read by Prof. RICHARDS at one of the sessions. After leaving this attractive school, the Institute spent the remainder of the day at Cambridge. President ELIOT entertained the members at dinner with characteristic cordiality, and the various scientific collections and laboratories of the University, including the Astronomical observatory and the Agassiz Museum of Comparative Anatomy, fully occupied the time until the shadows fell. In the evening, there was no formal gathering of the Institute, but a number of the members were guests of the celebrated "Thursday Club," which met at the residence of Mr. MUDGE, and listened to papers and remarks from Professor AGASSIZ, Professor WARE, Professor ROGERS and others. On Friday morning, a number of the members started for North Adams, Mass., to visit the Hoosac tunnel; but the great snowstorm which swept over New England on that day, giving reason to fear a considerable detention, caused the majority of the party to abandon the plan at Pittsfield, and to continue their homeward journey via Albany. Those who pushed on to carry out the original programme of the Local Committee had less trouble than was anticipated in reaching the tunnel; and, after a pleasant and satisfactory visit, returned without greater hardship than a considerable delay on the road.

We give herewith the names of all the new members and associates elected at the Boston meeting. These names will not be repeated in our reports of the several sessions; they will be found more convenient for reference in this collected form. The following are the names:

m. Edward Lyman, Troy, N. Y.
a. Calvin Wells, Pittsburgh, Pa.
m. Chas. W. Roepper, Bethlehem, Pa.
m. Wm. F. Singer, Pittsburgh, Pa.
m. E. G. Spillsbury, 187 Broadway, New York.
m. Oswald J. Heinrich, Midlothian Colliery, Chesterfield Co., Va.
m. A. Von Schulz, Central City, Col..
m. Ellsworth Daggett, Salt Lake City, Utah.
m. J. M. Adams, Silver City, Idaho.
a. Theodore D. Rand, 15 S. 3d Street, Philadelphia.
m. Prof. A. P. Rockwell, Institute of Technology, Boston, Mass.
m. Prof. J. M. Ordway, Institute of Technology, Boston, Mass.
m. Prof. Robt. H. Richards, Institute of Technology, Boston, Mass.
m. Dr. S. Dana Hayes, Boston, Mass.
m. Lyman Nichols, Jr., 89 Boylston street, Boston, Mass.
m. Thomas T. Bouvé, Boston, Mass.
m. R. W. Bender, East Boston, Mass.
m. Robert G. Leckie, Actonvale, Quebec, Canada.
m. Alfred W. Geist, 361 Columbus avenue, Boston.
m. William Maltby, Braidwood, Will County, Ill.
m. J. Johnson, Braidwood, Will County, Ill.

The only important announcements made by the Council were, first, that the fees of persons elected at this meeting would be considered to cover the year ending in May, 1874—a provision of manifest equity, since such persons cannot actively participate in any meeting before next May; and secondly, that the resignation of Mr. J. PRYOR WILLIAMSON, of Wilkesbarre, as Treasurer, having been accepted, Mr. THEODORE D. RAND, of Philadelphia, had been appointed Treasurer until the next annual meeting, a measure dictated by the convenience of having the Secretary and the Treasurer resident in the same city.

The New York Assay Office.

We are indebted to Mr. J. M. FLOYD, Chief Clerk of the U. S. Assay Office in this city, for the following statement of the business of the office during the year 1872:

	Gold Deposits.	Silver Deposits.	Gold Bars, Stamped.	Silver Bars, Stamped.
1st quarter	$1,522,703 19	$472,679 27	$1,167,631 27	$322,52 85
2d quarter	1,547,793 09	697,443 89	1,320,251 60	467,540 04
3d quarter	2,766,715 67	1,017,434 38	2,357,154 06	673 822 27
4th quarter	1,947,929 89	1,615,901 15	2,473,681 77	742,787 10
	$7,785,141 84	$3,803,458 69	$7,318,718 70	$2,206,580 26

Transmitted to U. S. Mint—Gold	$885,319 72
" " " Silver	$1,561,210 31
	$2,446,530 03

Amount recovered by the Melter and Refiner in his operations during the year 1872:

GOLD IN STANDARD OZ.

Operated on.....$402,725 00 Recovered.....$9,729 00

SILVER IN STANDARD OZ.

Operated on.....$2,699,225 00 Recovered.....$1,723 61

COMPARATIVE STATEMENT OF SILVER DEPOSITS FOR THREE YEARS.

1870.....$1,542,000 00 | 1871.....$2,925,000 00 | 1872.....$3,803,458 69

The amount of $11,452.61, "recovered" by the Melter and Refiner from the gold and silver submitted to him, is worthy of attention, as showing both the skill and the integrity of this officer. The meaning of this item is, that the melter and refiner, having been charged with a certain amount of gold and silver, the value of which had been determined by assay to within one-half of one-thousandth, has not only returned in bars the full value for which he was thus made responsible (claiming no allowance for loss in melting), but actually added $11,452.61. which was not on the record. This result reflects great credit upon Mr. MASON, the experienced and estimable officer referred to.

The Mint Trial at Philadelphia.

We learn that the Commission appointed by the President, for the annual assay at the Philadelphia Mint, has reported that the coinage of the last year was very close, in weight and fineness, to the standards prescribed by law. The silver coinage, indeed, is almost invariably finer than .900, the legal standard. This is due to the process employed in adjusting the weight, and known as "pickling," by which the amount of base alloy is slightly decreased. No officer of the Mint can profit by this small excess in fineness; but the Government loses something in making its coins, by a minute fraction, finer than they profess to be. The enrichment of the metal is, however, confined to a thin superficial portion, and this soon wears off in circulation. The subject of this trifling loss has occupied already the attention of Mr. Snowden, the able Chief Coiner, and other officers of the Mint; and no doubt the Director of the new Bureau, which goes into operation in April, will cause such thorough study of it to be made as will lead to a suitable change in the manipulations of coinage.

Railroad Accidents and Their Causes.

The *Railroad Gazette* is doing excellent work in collecting and publishing each month the statistics of railroad accidents. It has followed this course for twelve months, and though its early work was necessarily imperfect, and the months previous to July are not to be counted upon as fully reported, a comparison of the year's record is interesting. It is as follows:

	Number of Accidents.	Killed.	Injured.
February	21	18	128
March	27	3	67
April	22	13	32
May	27	9	33
June	44	63	114
July	31	35	66
August	63	15	49
September	71	24	104
October	90	29	102
November	103	37	114
December	112	42	133
January	178	40	199
Totals	789	328	1,141

Taking the months of August to January, including three months of warm and three of cold weather, we have for the half year a total of 617 accidents, with 187 deaths, and 701 injured; or, per day 3½ accidents, 1 killed, and 3 8-10ths injured. The table shows how suddenly the number of accidents increased with the coming of cold weather. As to the causes of the disasters, the summary for January is sufficiently indicative:

Derailments.		
Unexplained	42	
Broken rail	41	
Misplaced switch	9	
Broken wheel, flange or tire	8	
Washing out of road-bed	5	
Broken axle	4	
Broken or defective switch or switch bar	4	
Snow or ice	4	
Broken truck	3	
Fall of brake or brake beam	3	
Accidental obstruction	3	
Broken bridge	2	
Broken frog	2	
Broken car	1	
Running fast into siding	1	
Ox falling from car	1	
Rail removed for repairs	1	
		—134
Collisions.		
Rear collisions	15	
Head collisions	13	
Crossing collisions	1	
Unknown	4	—33
Explosion of boiler or flues		3
Broken wheel (no derailment)		3
Broken connecting rod "		2
Broken driving axle "		1
Unknown		2
Total		178

By these 178 accidents 40 persons were killed, and 199 injured more or less severely—an unusually small proportion of fatal injuries. Of the whole number 22 accidents caused death and 45 others injuries, so that 111, or five-eighths of the whole, caused no injury to persons. Quite remarkable is the fact that there were 41 cases of accident from broken rails, a number nearly equal to all the cases in the previous eleven months. Defects of rolling stock caused 28 accidents, and 43 were due to errors in running trains.

Figures like these are exceedingly suggestive, and the *Gazette* is doing exceedingly valuable work in collecting them.

Another Mechanical Puddler.

Mr. Thomas, managing partner of the Acklam Refinery, near Middlesbrough, England, has patented an arrangement for melting and puddling iron. It consists of a cupola furnace, which also serves as a gas generator, so that one operation melts the iron and produces fuel for the puddling furnace. At the last meeting of the Cleveland Institution of Engineers, Mr. Thomas read a paper on his new invention. The generator and melter is of the cupola form, with a hopper on the top, and two slide shutters. The blast enters at the back, and in front there is a large case lined with bricks, and filled with loose bricks, spaced off from each other. There is a hopper over the throat of the gas main. At the other end is the service pipe, and waste or safety-valve. At the bottom of the gas main are clear spaces with doors in front, so placed as to enable the attendant to clean out the dust and ashes. The patentee proceeds to say:

"The lower part, or melting zone, is fitted with cast-iron water boshes, with spikes or nibs to hold the lining. When the fire is lit, the furnace is filled up to the shutter with a proper proportion of fuel and metal. The shutters are then closed and the blast set on. By the aid of these two slide shutters the pressure of gas is kept constant, even while charging. Under the shutter is a small pipe. This is to lead away the steam and light explosive gas, that would otherwise collect there. This pipe should always be wholly or partly open, so as to give not even a chance of explosion.

"As the gas cannot escape by the top of the generator, it must pass through the chamber of bricks. The bricks are there to take up the heat from the hot gas and retain it. They also arrest the dust and ashes, precipitating them to the bottom, where spaces are provided to receive them, as also the means of cleaning them out.

"To enrich the gas and increase the quantity when required, the small hopper over the throat of the gas main is charged in the same way as the gas generator—by two slide shutters. The cupola producing carbonic oxide, and the coals in the throat opposite the blast yielding carburetted hydrogen, gas equal to that made by Mr. Siemens, will be obtained, but with this difference—Mr. Siemens generates the gas, cools it, and then re-heats it; whereas I keep it hot after generation. Again, Mr. Siemens conveys the gas to the furnace, to be heated by gravitation, caused by inclining the gas tube; I use the air blast, which may be heated before entering the generator, causing the oxygen to unite quickly with the carbon, and preventing the carbonic acid generated at the tuyere from reaching the gas main. Let us now pass to the puddling machine.

"My scheme of a puddling machine is a pan wheel, revolving round a fixed center. This pan is set on rollers, adjustable with a wedge and screw under the bearings. The rollers with the pan wheel thereon are fixed on a carriage with wheels. By wheeling out this carriage, the revolving pan can be drawn off clear from the fixed center. This fixed center is built with bricks between two hollow discs, supported on a strong shaft. Apertures are made through the center brick-work for letting in the gas and air, for agitating the metal when necessary, and for letting out the burnt gas, leading it to the stove for heating the air. The revolving or pan wheel is made by setting two or more rings on the rollers, and fixing T irons across them to form the bottom or pan of the wheel. The ends are fastened with angle iron rings, and the cross irons are filled up between with oxide of iron so as to form the bottom. When working, a small stream of water is run round the angle iron rings at the ends of the pan wheel, to keep down the temperature. Water is also run through the discs that support the fixed center brickwork. There is an air valve and a gas valve for regulating the quantity to be admitted. It is proposed to enclose the whole machine with a double plate canopy, having an air passage between the plates to keep the outside cool. The front of the canopy is intended to be fixed on the carriage so as to keep off the heat of the pan wheel from the workmen, while taking out the ball.

"When the revolving pan wheel is hot enough, the metal in the gas-generating and metal-melting furnace is tapped, and runs, by gravitation, into the pan wheel. Some cinder or fine oxide of iron is thrown into the pan. Revolving slowly at first, a full quantity of gas and air is kept on, to well heat the metal and fluxes. When necessary, iron bars are thrust in to stir up and thoroughly mix the metal with the melted oxide. When the iron begins to agglomerate, the air is eased off, and the gas increased, the damper in the waste gas culvert being lowered. The machine is then made to revolve faster, that the iron may turn and fall more quickly. By this means the sub-oxides in the iron are reduced, and by the rapid falling into the cinder the excrescences of the ball will be welded in, the ball itself also being thereby condensed by having its cinder knocked out of it.

"When the ball is ready, the revolving pan wheel is withdrawn from the center, and the ball taken out. If the pan wheel requires settling, it is made to revolve, and the liquid cinder is worked from side to side with a rabble, until it sets hard. If there be too much cinder, an iron ladle is introduced, which ladles out the cinder into a bogie to be taken away."

In drawing attention to the plan intended to work these in combination, the patentee showed four puddling machines in position with melting furnace and gas generator to supply them with metal and fuel. It is calculated that, with the apparatus in full working order, one ton of puddled iron can be produced with 3 cwt. of coke combined with 2 cwt. of coals. It is proposed to make balls of 5 cwt. each, to shingle them, then reheat; and if for best iron, to hammer them again; then reheat a second time, and roll off to section required.

A platform car belonging to the Philadelphia and Erie Railroad, and which had stood on the track during a snow storm, was weighed to ascertain the weight of the snow. A depth of seven inches on a surface $32 \times 7\frac{1}{2}$ feet weighed 1,300 lbs.; the snow not damp or packed, but just as it fell in average cold weather. The above trial gives for ordinary snow a weight of 9¼ lbs. to the cubic foot.

The Report on Pig Iron.

THE report of Mr. DUNLAP, Secretary of the Pig Iron Association, showed that more than one-half the total production of the country was made by furnaces represented in the association.

	Total Make, 1872.	Reported by Members.
Anthracite	1,197,010 tons.	750,875 tons.
Raw Coal and Coke	712,500 "	501,258 "
Charcoal	478,500 "	217,490 "
	2,388,010	1,469,623

The increase in the number of blast furnaces for 1872 far surpasses that of any year of which we have record. The total number of new furnaces built or begun in 1872 was 109, and of those projected for 1873, which only includes those actually determined upon, was 39. Giving this number an average daily product of 15 tons, and of 200 days in blast, we would have an addition to the product of 1870 of 327,000 tons. Fears have been expressed that this great number of new furnaces built would, in connection with existing capacity, overstock the market. We have only to note in reply to this that there have been 50 new rolling mills built or begun, and that fully 30 per cent. has been added to the former puddling capacity of existing mills. When we review the figures of consumption, it will be clearly evident that the pig metal production is yet far behind demand.

Imports of all kinds of iron, for the year, ending June 30, 1871 and 1872. were as follows :

Commodity.	Quantities. 1872.	Quantities. 1871.	Values. 1872.	Values. 1871.
Pig Iron	277,233	199,516	$5,122,318	$3,106,490
Bar Iron	118,227	101,752	5,153,472	4,058,126
Plate Iron	700	549	57,392	31,284
Hoop and Scroll	11,718	11,222	573,457	506,501
Sheet	14,752	10,489	1,116,200	610,809
Railroad	472,370	513,023	15,778,941	17,360,297
Rails, steel	122,956	.....	6,040,678	3,783,526
Old and Scrap	236,662	155,805	.....	.....
Totals	1,254,618	992,356	$33,842,458	$29,456,033

CONSUMPTION.

The figures of the consumption of iron in our country are startling, although still only approximate, since it is impossible to obtain the requirements of all branches of trade. The following will give a good idea of what amount of iron we use :

	Tons.
Production of Pig Iron, say	2,400,000
Importation, of all kinds, fiscal year	1,254,618
Total	3,654,618
Add American Scrap used	400,000
Total Consumption of Raw Iron	4,054,618

Where this is used may be imagined from the following statistics, which, so far as they go, are trustworthy :

No. miles railroad in the United States	70,000
Tons of iron required to equip this at 150 tons per mile	12,250,000
Required per annum for repairs, 10 per cent	1,225,000
Increase for last three years, 14.2 per cent	1,428,500
Annual increase, 7,000 miles per annum	1,050,000

Total requirements of the railroads per annum, 2,478,500 tons, or more than the total product of pig iron in the Union. This railway consumption is divided per mile as follows : For rails, including track supplies, 100 tons ; for locomotives, 25 ; for cars, 20 ; for sundries, 5.

A few of the other sources of consumption are very correctly approximated, as follows : Gas and water pipe, 190,000 tons ; ship-building, 40,000 ; stoves, 250,000 ; mowers and reapers, 33,000 ; other agricultural implements, 150,000 ; miscellaneous castings, 600,000 ; sewing-machines, 20,000 ; nuts and bolts, 250,000 ; nails and tacks, 250,000 ; architectural iron, 150,000 ; total, 1,833,000 ; railroad as above, 2,478,500 ; total, 4,311,500 tons.

These figures show clearly that without counting for any increase of business the total possible product of pig metal for 1873 or 1874 cannot supply the demand for actual requirements.

The ore production for all regions is not reported, but some of the principal ore fields yielded the following quantities : Lake Champlain, 375,000 ; Missouri, 391,474 ; Lake Superior, 952,055 ; Wisconsin, 93,500 ; total, 1,812,029 tons. The total production of ore in the United States for 1870, as stated by the census was 3,210,918 tons, and in view of the increased development since, it is fair to estimate the increase at 150 per cent., that is 6,421,836 tons. New ore fields are being everywhere opened and every effort made to increase the supply, with a fine promise. Lake Superior is an example of the remarkable increase of production of some of these ore districts. In 1856, the total value of ore and pig iron was only $28,000, 7,000 tons being shipped. In 1872, 1,015,250 gross tons were shipped, valued at $9,188,055, being an increase in 16 years of $9,160,055 in value and 1,088,250 tons in quantity. During the 16 years named, the total production has been : Ore, 5,537,373 tons ; pig iron, 357,800 tons ; both, 5,903,803 tons ; total value, $44,273,833.

In closing this branch of his report Mr. DUNLAP says : This is neither time nor place for rhetorical display, but in simple earnestness we ask ironmasters if the outlook for the iron industry to-day is not far more encouraging than at any previous period. The world is iron hungry now, and neither high prices nor any increased production possible for the present will satisfy its cravings.

BESSEMER PRODUCTION.

The manufacture of pig iron, free from phosphorus and suited for conversion into Bessemer steel by the pneumatic process, has become a very important branch of the trade. New Bessemer works have been completed at several points during 1872, and several are projected for 1873. Works completed are as follows : Chicago, 1 ; Joliet, 1 ; Springfield, 1 ; Illinois, 3 ; Johnstown, 1 ; Bethlehem, 1 ; Pennsylvania, 2.

There are new works projected at Pittsburgh and Sharpsville, Penn. ; Indianapolis, Ind., and Carondelet, Mo. The total amount of pig iron converted into Bessemer steel during 1872 was 125,361 tons, and the Bessemer steel rail product was quite 90,000 tons.

The Cost of Stoves.

At the late meeting of stove manufacturers, in Pittsburgh, the president gave the following calculations as a basis for fixing the price :

"I think with iron at $50, coal at $7 50, delivered in the yard, and other advances which we have considered, we can fairly assume that the cost during the present year of a fair assortment of stoves will not fall below the following amounts :

On a product of 819 tons	$145 33
On a propuct of 1,500 tons	141 20
On a product of 3,000 tons	132 50

"I am well aware that the lowest grade of stoves will not cost this sum, but taking a fair average of such an assortment as the market now demands, I think it would not be safe to estimate upon a lower basis. I would recommend that the minimum prices for the year 1873 be as follows : On the first grade of stoves, 9½ cents ; on the second grade, 8½ cents ; on the third grade, 7½ cents, and on odd castings 9 cents. Discount on hollow ware, 20 per cent."

Engineering and Mechanical Notes.

M. CHENOT, well known as the inventor of a method of producing iron direct from its ores, proposes to lessen the loss by friction in rolling mills by the use of hydraulic bearings, and by friction rollers. He gives the preference to a collar of friction rollers, of about two inches diameter, surrounding the journals. At the ordinary working speed, the rollers would make 230 revolutions per minute, which is a lower speed than that given to similar rollers in carriage axle bearings, where they have been applied with success. In a large mill it is calculated that the loss by friction amounts to 40 per cent. of the power.

Experience at the Boston fire demonstrated that dynamite is the proper explosive to use in blowing up buildings, whenever that becomes necessary. Its powerful action and ready transport make it better adapted than powder which is more likely to cause accidents.

The Joliet Bessemer Steel Works made their first blow on Monday, January 26. The *Bulletin* of the Iron and Steel Association learns that it was a decided success, and that it was expected that steady work would begin in a few days.

MINING SUMMARY.

THE ARUBA ISLAND GOLD MINING COMPANY.

From the London *Mining World*

The first general meeting of shareholders was held at the offices, Gresham House, on the 11th instant. The chair was taken by Mr. John Stewart. The notice convening the meeting was read by the secretary, Mr. Archibald Mackenzie. This company, as the report states, was registered on July 4th, the capital having been subscribed in full without any public appeal. The transfer of the Aruba Island concession, the necessary papers of which were made and executed under the supervision of the company's solicitor, has been acknowledged and confirmed by the Colonial Government of Curacao and Aruba. This concession comprises the minerals of the entire Island of Aruba in the Caribbean Sea, with whatever land is necessary for the erection of mills, warehouses, and other buildings required for the prosecution of the work of development. The Island is 8 miles wide by 25 miles long. There are 200 gold-bearing quartz veins already discovered and partially developed. The concession includes all veins that may be discovered on the Island for the term of 30 years ; all the ore upon the surface, amounting to some 21,000 tons ; and all the miners' tools and plant now upon the Island. The total amount of the purchase money has been paid to the vendors.

Operations for the present will be confined to one out of the 17 districts upon the island, and the Bushiribana district has been fixed upon, which, from the explorations already made, it is believed will yield sufficient ores to keep 200 stamps constantly employed for many years. A mill site has been decided upon near the vein of that name, and in close proximity to the sea. A good wagon-road has been constructed from Orangestadt to the proposed site, and the foundations are being prepared to receive the mill and machinery. Stone buildings for the superintendent and for an office are in progress of erection near the mill. Lime, rock, and labor are plenty and cheap. The cheapness of labor will prove greatly advantageous to mining operations, and we are informed that Superintendent Rule is employing a force of 150 men at the rate of 14d. per day, and can readily obtain 300 or 400 more at the same rate for nine hours' labor. He represents them to be a very industrious and superior class of laborers. The necessary materials for working a heavy additional force of men will be forwarded immediately. From reports recently made, it appears that the existence of gold-bearing quartz in inexhaustible quantities upon the island is beyond doubt. It has been decided to build only 20 stamps, at first to avoid mistake. Blake's crushers, amalgamators, and concentrators complete, of capacity for crushing and treating 40 tons of ore in 24 hours, are to be used. The West Point district is to be surveyed immediately, with a view of ascertaining the most economical manner of developing and working it. This will enable the company to treat with parties who may desire to lease or work on shares. The same plan will be pursued as to other districts. Fine specimens of gold have been found in the gulches of the island, and the gulches will no doubt in time be properly worked. The estimated cost of the machinery ordered is about £10,000, and of other supplies £2,000.

The latest reports set forth that the Kadushi shaft has been timbered ; the lode is

ft. wide, looking well, the white quartz showing gold by panning. The vein dips to the south, at an angle of 5 deg.; the hanging wall is very smooth and regular. When the shaft reaches 60 or 70 ft. drifting will be commenced east and west on the vein, preparatory to stoping out the ore. Two other shafts further west are going down, at points 75 and 150 ft. distant where the vein is about 3 ft. wide, the ore showing coarse gold. There are several other shafts and adits pushing onwards. Supt. Rule, in his report, states—"On the whole the Kadushi is looking finely, and I believe that this vein alone, when developed, will be of more value than you have paid for the whole concession." Every detail is being conducted with the greatest economy, although cautiously; and when the way is seen clearly more vigor will be added. Mr. J. Ford was appointed auditor at a remuneration of 50 guineas. A resolution was passed thanking the executive committee for the satisfactory manner in which they had conducted the affairs of the company. A new company is to be organized to work the West Point district, with a capital of not less than £100,000. The 15 other districts are also to be developed by 15 new companies. The executive committee was authorized to call up the remaining 40 per cent, upon the stock as they may think proper.

Arizona.

Correspondence of the San Francisco *Mining and Scientific Press* of Febuary 1.

The town of Ehrenberg is situated on the Colorado river, about 100 miles above Fort Yuma and about 300 miles above the mouth of the river, in Arizona. La Paz, at present an uninhabited town, is situated about six miles above Ehrenberg, also on the Colorado river. From the neighborhood of La Paz, a solid range of primitive mountains runs from S. SW. to N. NE. almost parallel with the Colorado and two similar ranges east, separated by great plains from seven to fifteen miles wide. The first range ceases about eight miles north. In the middle of this range, east from La Paz, is a good and splendid pass leading to the great gold fields discovered in 1860, and ever since worked very successfully by dry washings, for the want of water. These placers begin about seven or nine miles from a town in Ferra's Gulch; from here they go easterly through various gulches to the pass. This gold is very fine in quality but coarse in appearance. I am told, that pieces from two and a half to three ounces were found here. This pass is small and narrow at first, but widens soon. The ranges north are principally granite and are the head auriferous range of this part. Those to the south are tapped by gneiss and primitive slates traversed by a great number of veins of argentiferous copper ores, consisting of sulphurets with a high percentage of silver and gold. The ground between the two ranges last spoken of, forms a triangle of an area of ten miles of which the greater part is formed by low rolling hills of talcose and other slates, only broken at one point by quartz and porphyry, forming a peak. Around this peak appear large, solid quartz veins. All the rolling country is in fact full of large veins of auriferous quartz. At the foot of this mountain range, about twenty miles from Ehrenberg, are very large outcrops of very good gold-bearing quartz of great regularity, and deeply stained with oxide of iron.

The largest of these outcrops are the Constantia and Los Pasos, from 8 to 24 feet in width and plainly visible for a distance of three miles; sometimes, after being plainly visible for 300 or 400 yards, disappearing for a short distance among the rolling hills, but always reappearing again. An immense quantity of quartz is in sight, showing gold everywhere. There is no place over the whole surrounding country, but that you can wash out gold.

THE CONSTANTIA LODE

Has a very good appearance, and is in reality a valuable property. If situated in California it would advance to one of the first mines in the market. The Constantia is a regular solid, rich vein. The gold is distributed through the whole vein, from southeast to northwest, and so also through the whole of the present explored depth of 105 feet. To the northwest the vein appears the richest. There are places which assay over $300 per ton, for a distance. The gold appears in two forms. In the ferruginous quartz it is very fine wherever the rock is broken. It appears coarse and solid, sometimes with pyrites of iron. A string of a reddish earthy mass contains very fine gold in great quantities. Through the whole vein, wherever this reddish, earthy mass (decomposed pyrites) appears, the percentage of gold is the highest. In this mass the assays are from $90 to $300 per ton. In general, all over the vein the assays will give at my lowest estimation from $25 to $35 per ton.

DESCRIPTION OF THE CONSTANTIA MINE.

Commencing southeast 650 feet from the northwest boundary of the Constantia, we have shaft No. 6 driven and sunk on the vein 100 feet deep. From this shaft a drift runs north eight feet; 130 feet more southeast is a small shaft 22 feet deep, from which runs a drift southeast 25 feet long, which shows the vein in splendid condition, eight feet wide and containing a high percentage in gold. From this little shaft still further southeast, 65 feet, is a shaft 90 feet deep. From this shaft at a depth of 35 feet a drift runs northwest seven feet and 50 feet southeast to another shaft, 97 feet deep, and from this shaft still 75 feet southeast. In this shaft the hangings and footwalls are both very regular. The vein in this shaft is five feet wide. At the northwest end of the drift the vein is also five feet wide: crossing the 90 foot shaft to the southeast the vein widens to 11 feet; towards the 97 foot shaft the vein turns narrower and is at the southeast end of the drift only two feet wide. Through the whole drift its appearance is very good and shows free gold everywhere. Through the 90 foot shaft the vein widens from 3½ to 11 feet.

Seventeen eet north northwest of the 97 foot shaft is a little shaft sunk, only three feet in diameter, for the purpose of hoisting ore from a surface drift, running 40 feet northwest, which is about 18 feet deep. Here, at the crosspoint of this little shaft with the surface drift, the vein disappears, but is found again 15 feet deeper from the drift and also 15 feet further southeast; commencing on the footwall, 100 feet southeast from the 97 foot shaft, is another shaft 80 feet deep. Upon a depth of 50 feet in this shaft runs a drift 32 feet southwest through the footwall and another drift 12 feet northwest, which strikes the vein one foot wide. The southwest drift stays in the slate six feet deeper from the drift. The vein appears in the shaft two feet wide and reaches at the bottom of the shaft a width of six feet. This shaft is commenced in the headwall of the vein.

Nearly 600 feet further southeast from the 80 foot shaft is sunk a vertical shaft, belonging to the Los Pasos mine, which strikes the vein 1½ to 2 feet wide, at a depth of about 30 feet. This shaft is 100 feet deep. The vein has a fall from 45 deg. to 50 deg. but dips at a depth of about 60 ft. in the 90 ft. shaft suddenly, with a fall of about 75 deg. In my opinion, the disappearance of the vein in the little shaft is only a springing of the vein, as the vein appears again only 12 feet south of the drift as a large *halvoirkel* pointing out at its ends, and in the surface drift about 26 feet northwest of the little hoisting shaft, has a width of 24 feet of very rich gold-bearing quartz; not the whole 24 feet is quartz, but from the footwall eight feet of rich quartz, then four feet talcose slate and then again 12 feet quartz. Here the vein shows this string of a reddish, earthy mass of high percentage in gold, larger and richer than anywhere, and this is the same string that assays in the 90 fooot shaft 10 or 15 feet below the surface, over $300 in gold per ton.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. All members and Associates who pay their dues ($10,) for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

Those members and associates who have not paid their dues for the current year, are requested to do so at once. Money may be sent in postal orders, checks or bank bills, to the Secretary, THOMAS M. DROWN, 1123 Girard street, Philadelphia, Pa.

II. It is expected that the more important papers, read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October.

THOMAS M. DROWN, Secretary.

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Nov 19:1y

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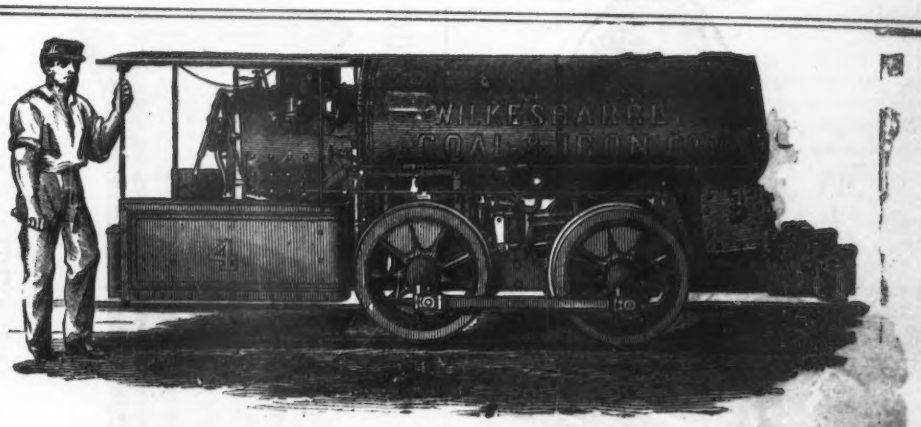

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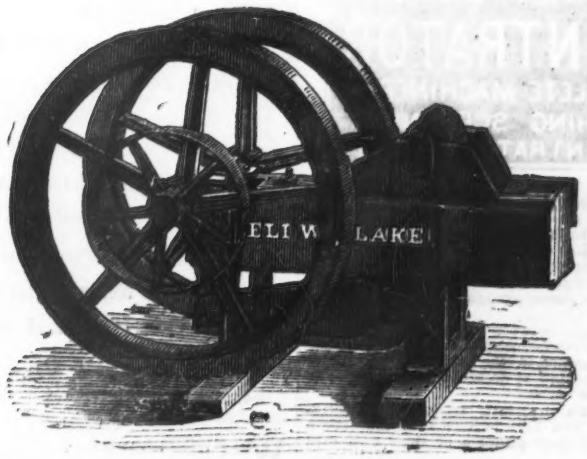

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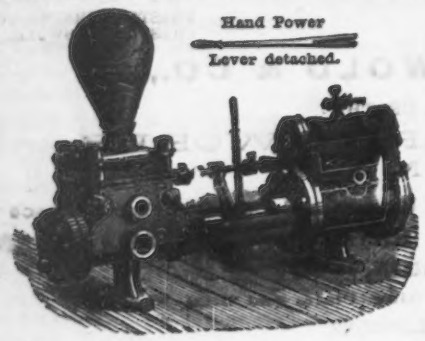

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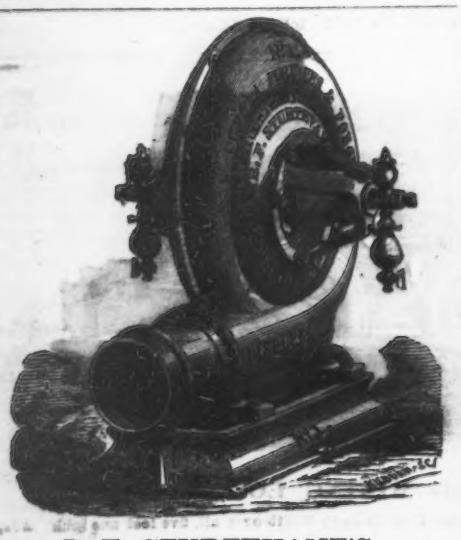

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MISCELLANEOUS.

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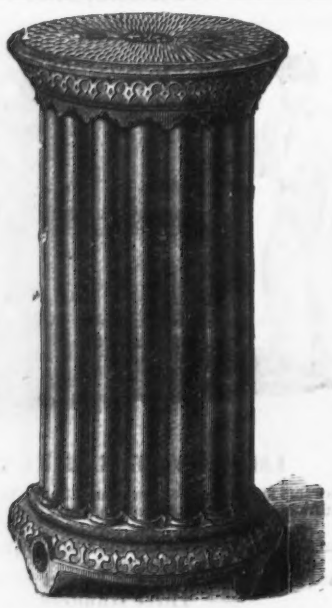

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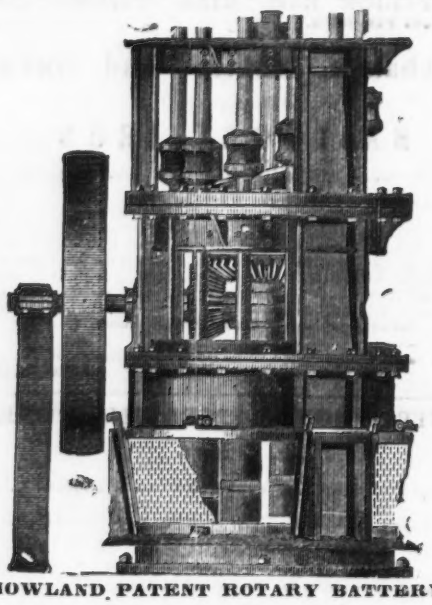

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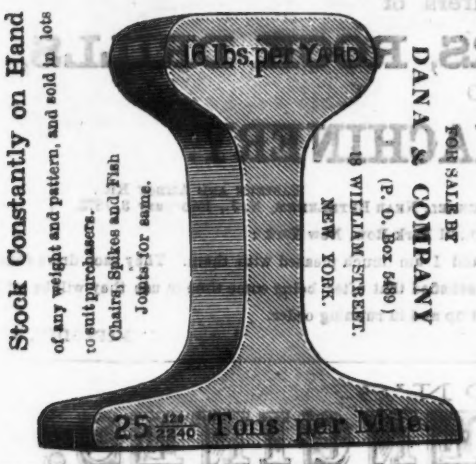

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Bucket Plungers are the best. Send for Circular. Valley Machine Co. Easthampton, Mass

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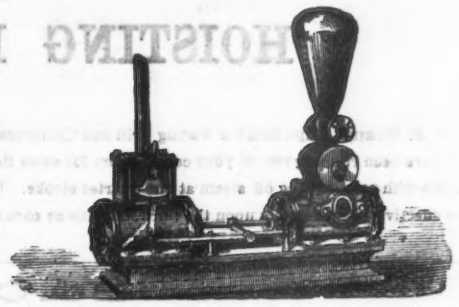

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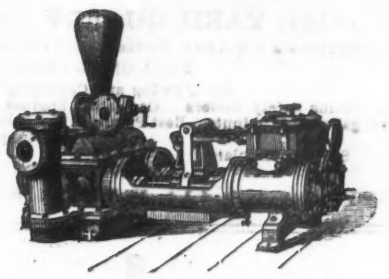

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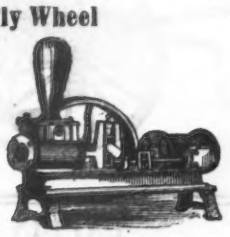

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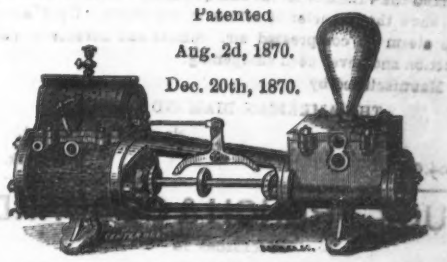

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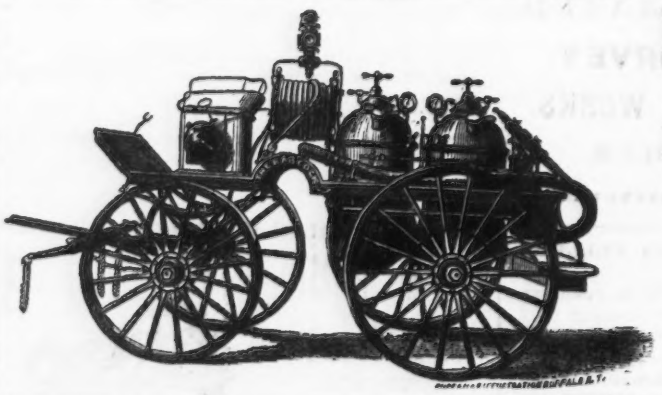

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